

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

Military Aviation in Parliament.

One of the most interesting, and at the same time by far the most satisfactory, statement that has fallen from a Minister of the Crown in relation to military aviation, was that made by Col. Seely, on Wednesday evening to the House of Commons. It may be that the record of work actually accomplished is not such as will satisfy to the full the most hypercritical of those observers who are at the same time students of the aerial defence problem, but at least, the War Minister's statement indicated that the seriousness of that problem is being realised by the Government and its advisers. It is scarcely necessary for us to refer in detail to the facts laid before the House by Col. Seely, since we publish in other pages of this issue of FLIGHT so much of the reports of the discussion as are germane to the issues.

After generalising upon the policy of the War Office, Col. Seely proceeded to justify the handing over to the Navy of the airships which have hitherto been under the administration of the Military Wing. The reasons given for the change are, to our mind, entirely satisfactory, but there is just this one point of criticism to be made. He

told the House that in time of necessity the Navy would hold at the disposal of the Army such lighter-than-air craft as would be required. We should have liked some more definite assurance as to this, for it is quite conceivable that when the time comes the Navy will discover that it needs all these craft for its own purposes, and that the Army will thus have to go short. That is somewhat disquieting, assuming that airships are, equally with aeroplanes, an essential part of the equipment of an army in the field, and they should assuredly be of use.

Col. Seely next assured the House that the Military Wing was now in possession of 161 machines, and that the full establishment aimed at was 250, of which 200 would be required for the squadrons, and 50 for the Central Flying School. He further pointed out that the British Army, under such an establishment, would be better equipped in proportion to its numbers than that of any other Power. That is in itself satisfactory, but it would have been much more so had he told us what plans have been made for equipping the Home Defence forces with the necessary aerial service in case of invasion when the Expeditionary Force is employed overseas. The reply to this question was that the matter was engaging attention, but while we are quite prepared to concede that a good deal of progress is being made, and has been achieved, we are inclined to look somewhat askance at this phrase, which falls with such facility from politicians with awkward things to explain. We are quite well aware that the doctrine is that while the Regular forces are out of the country it is the business of the Navy to see that our shores are kept inviolate, but it has been proved by the naval manoeuvres of the past two years that invasion is not at all a remote probability even with our Fleet intact. That being so, it is surely necessary that the Second Line should be properly equipped to deal with invasion, and without aircraft in commission it cannot be said to comply with the conditions. However, it may be that Mr. Churchill will have something to tell the country later on with regard to the aerial preparedness of his own Service which may exercise some modifying influence on these opinions.

Col. Seely expressed the opinion that the British industry was now quite capable of supplying all the aeroplanes we want, and a great many more. In earnest of this, it was stated that of 100 machines acquired since last July 89 were built in this country. How many of these 89 are fitted with British engines? Not even the odd nine! Therefore, it is playing with facts to say that

we can turn out all the machines required. It is true, as Col. Seely said, that before long we shall be able to produce engines in sufficient numbers, but the point is that we are not so doing now, we never have done, and could not at the moment. To a great extent this is due to the want of encouragement given by the Government to the British engine builder. True, this it is hoped to remedy through the Government trials in April, but even here a distinct *faux pas* has been made by the issue of a circular letter to the competing firms, drawing attention to the fact that the winners of the first prize will not necessarily secure the big contract that was held out as a bait to entrants. We do not particularly quarrel with the War Office for putting itself in a safe position, but it does seem to be a pity that such a disquieting document was issued at the present juncture. One of the effects inevitably produced is that of giving rise to the fear that the War Office may do as it has been accused of doing in the matter of the aeroplane itself—appropriate the best features of design and have engines built in the R.A.F. We do not for an instant believe that there is any *arriere pensee* of the kind—but there is the fact.

It is encouraging to note that the future policy is to have the larger proportion of machines required constructed by private firms. Col. Seely also announced that a proportion would be constructed in the R.A.F., these being machines of a special type, the details of which it is desired to keep secret. We confess that we do not like this at all. The purpose of the R.A.F. is to carry out experimental work and repairs—not to act as a building department at all. Surely, it is possible to ensure that the details of Government work given out to private firms shall be kept secret. No difficulty is experienced in any other Government department in this matter, and we are at a loss to know why this branch of the Government services should present any points of difference from, say, naval construction. Naturally, something depends on the relative proportions, but we desire to emphasise the opinion we have already expressed, that the R.A.F. ought to be confined to the work for which it was designed.

However, in spite of these possibly minor points we must express ourselves as being fairly well satisfied with the statement as a whole, for after all a full realisation of the importance of aviation and its vital consequence to the State is the best guarantee of future progress, and that was certainly manifested by the statement of the Secretary for War.

War Office Tests for Military Machines. Last week we published a War Office *communiqué* relating to the tests to be undergone by privately constructed aeroplanes intended for military use, in which were set out in full the conditions of speed, fuel capacity, climbing capabilities, and other miscel-

laneous qualities which the military authorities consider are required of the machine which is efficient from their point of view. In the light of all the criticism which has been passed upon the War Office as to the methods which obtain when that department is dealing with the private constructor, the schedule is of more than passing interest, showing, as it does, that the military authorities are fully alive to the fact that the aeroplane is a machine which is still in process of development, and of which too much must not be asked at the present juncture. For instance, in the matter of fuel capacity, the War Office stipulates that there must be an endurance quality of from two to three hundred miles, according to the type of machine employed. This is not by any means asking too much, since the fuel endurance capacity of the average machine is fully up to, and in many cases exceeds, the stipulation. Then in the matter of useful load, the requirements do not seem to us to be at all excessive. "Light scouts," for example, are only asked to carry the pilot *solus*, which is about the irreducible minimum that can be asked. "Reconnaissance aeroplanes" must be capable of carrying pilot and observer, plus 80 lbs. for wireless equipment, again a minimum below which it is inconceivable such a machine should be asked to comfortably carry. In the case of "fighting aeroplanes" the requirements are necessarily more extensive, since the minimum stipulated for is the weight of pilot and gunner, plus 300 lbs. for weight of gun and ammunition in the case of machines of class (a) and 100 lbs. in the case of (b).

Again, in the case of climbing requirements we find that the capability is assessed in the ratio of 700 feet per minute in the light class, ranging down to 350 feet per minute in the case of "Fighting Aeroplanes (a)," certainly not an excessive figure in the light of ascertained performances of analogous types. And so on throughout the whole set of conditions—it seems to the observer that in laying down these conditions the War Office authorities have had before them the salient fact to which we have already drawn attention, that the aeroplane is a machine which is even now in constant process of evolution, and is therefore a type to which every allowance consistent with the requirements of efficiency must be made.

Nor are the actual tests set forth in the *communiqué* to which each machine submitted for approval must be subjected unduly onerous. A thorough examination for workmanship and material, a rolling test, and one hour's flight are certainly not tests which err on the side of undue severity. Nothing less, indeed, ought to be exacted from machines of a type upon which it is quite conceivable our success in war may one day depend. As a matter of fact, we should not take it a matter requiring adverse criticism at our hands if the authorities had made the test far more stringent than they have seen fit to do.

C. GORDON BELL.

A UNIQUE experience is Gordon Bell's, for since he took up aviation in November, 1910, he must have flown more makes of machine than any other pilot. His first experiences in the air were with the old Avro triplane, but he actually secured his certificate on the famous Hanriot "Henrietta," at Brooklands. He then became manager and *chef pilote* of the Deperdussin school at Brooklands, and later piloted the Martinsyde monoplane. Being engaged by the R.E.P. firm, he was for some eight months in France, varying this with a trip to Turkey for the purpose of organising a military school, while he made the

first flights over Constantinople, and from Europe to Asia. In the British military trials he was on a 100 h.p. Deperdussin, and gained a third prize, following this up by flying as a Lieut., Military Wing, R.F.C., in the Army manoeuvres. For the last eighteen months he has been head pilot to Messrs. Short Brothers, of Eastchurch, chiefly engaged on waterplane work. In between whiles he is game to fly any machine which comes his way. Beyond his bad smash at Brooklands, he has been fortunate in keeping clear of mishap.

THE HAWK.

FEBRUARY 28, 1914.

FLIGHT

MEN OF MOMENT IN THE WORLD OF FLIGHT.



MR. C. GORDON BELL.

HOLES IN THE AIR.

IN the recently issued Annual Report of the Smithsonian Institution, Washington, U.S.A., a paper is contributed by Professor W. J. Humphreys of the U.S. Weather Bureau, in which he examines the structure and the cause of air pockets, and suggests where and when they are most likely to occur. He states that holes in the air, in the sense of vacuous regions, do not exist; but conditions in the atmosphere favourable to precipitous falls, such as would happen in holes, are present, and these he divides into two groups, with respect to the method by which they may cause an aeroplane to fall in the following manner:—

(a) Vertical Group.

1. *Aerial Fountains*.—Uprushes of air, most numerous during warm clear weather and over barren soil, especially above conical hills, are disconcerting and dangerous to the novice, but do not greatly disturb an experienced aviator.

2. *Aerial Cataracts*.—Downrushes of the free air, like the uprushes with which they are associated in a vertical circulation, though less violent, must also be most frequent during warm weather when the ground is strongly heated. They, too, however annoying to the beginner, should not be dangerous to the experienced man, because even when strong enough to carry the machine down for a distance their descent necessarily becomes slower and their chief velocity horizontal before the surface is reached. Downrushes of weighted air over precipices, analogous to waterfalls, must be strictly avoided.

3. *Aerial Cascades*.—The lower wind, in following as it must surface contours, sweeps down to the leeward of hills and mountains in cascade-like falls, and the stronger the wind the more rapid the cascades. But they are of no danger to the aeronaut so long as he takes the precaution to keep above the eddies and other surface disturbances.

4. *Aerial Breakers*.—The choppy, breaker-like winds of thunderstorms that surge up and down and in all sorts of directions are as much to be avoided by aerial craft as are ocean breakers by water craft. Hence a flight should positively not be attempted under any such circumstances.

5. *Wind Eddies (forward side)*.—The air on the forward side of a strong eddy has a rapid downward motion, and therefore should be avoided. If caught in the down current of an eddy the aeronaut should head lengthwise of the hill or mountain to which the eddy is due. By heading away from the mountain he might, to be sure, get entirely out of the whirl, but the chances are just as great that instead of getting out he would only get the deeper in and thus encounter downward currents swifter and still more dangerous than those he had sought to shun.

(b) Horizontal Groups.

1. *Wind Layers*.—The atmosphere is often made up of two or more superimposed layers moving each with its own velocity and

More Funds for Naval Aeronautics.

ON Wednesday a supplementary estimate for a further sum of £2,500,000 required for the Navy for the year ending March 31st, 1914 was issued. Of this sum, £5,000 is required for the accommodation of seaplanes at Sheerness, and £42,000 for airship accommodation.

direction. Such a condition is a source of danger to the aeronaut because transition from one of these layers to another more nearly coincident in direction and velocity with his aeroplane is certain to result in at least a sudden decrease in the magnitude of its supporting pressure and in the effectiveness of the balancing devices. Under certain extreme conditions this transition, even when the winds are parallel, is well nigh inevitably disastrous. When the layers move more or less across each other, as they usually do, the turmoil of the resulting short and choppy billows, by rendering equilibrium difficult, add an additional danger all their own.

Dangerous wind layers are most frequent at flying levels during the transition of fair to foul weather.

2. *Wind Billows*.—Wind waves analogous to water waves are set up at the interface between two layers that are moving with different velocities. If both layers are moving in the same direction, the resulting waves are long and regular; if in different directions, they are short and choppy. Therefore, other things being equal, it obviously is advisable to keep within the lower layer, or at least to get away from the billowy interface, either above or below, and to avoid crossing it oftener than is absolutely necessary.

3. *Wind Gusts*.—The horizontal velocity of the wind near the surface of the earth is exceedingly irregular and fluctuates from second to second at times by as much as the whole of the average velocity. In such a wind, if at all swift, the support to an aeroplane is exceedingly erratic and both its launching and its landing full of danger.

Obviously, too, the stronger the wind the higher, because of these surface disturbances, one should fly, if at all.

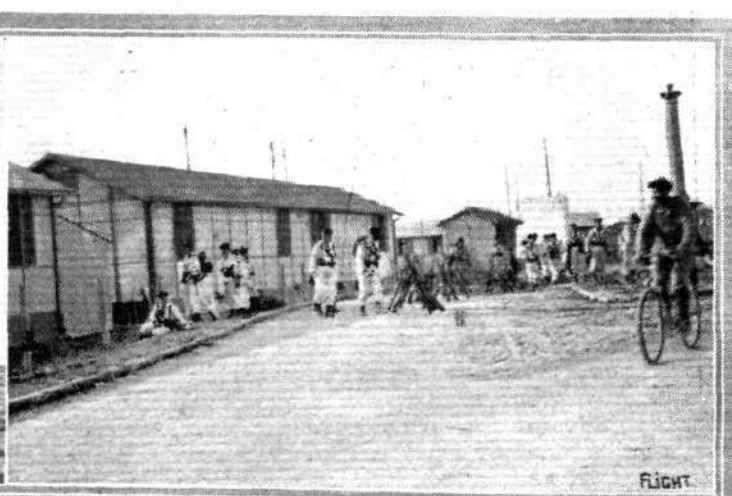
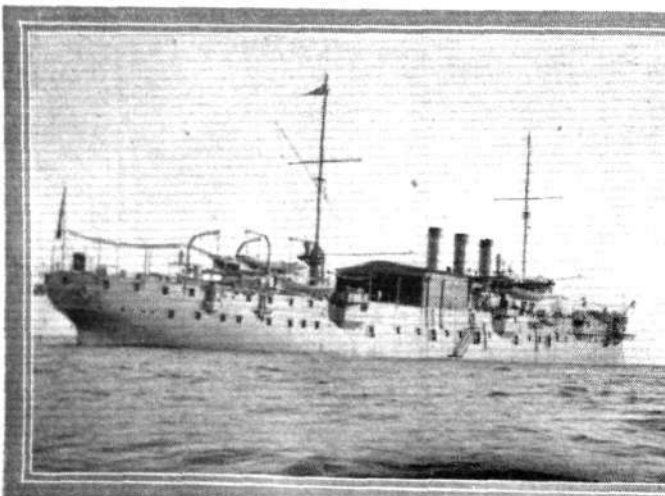
4. *Wind Eddies (central portion)*.—Eddies, or horizontal rolls in the atmosphere, are found on both the windward and lee sides, especially the latter, of cliffs and steep hills and mountains. When the wind is strong a landing should not be attempted in any such place. If forced to land in a place of this kind, the machine should be headed along and not at right-angles to the direction of the hill.

5. *Aerial Torrents*.—Steep barren valleys, especially of clear still nights and when the upper reaches are snow covered, are the beds of aerial drainage rivers that at times amount to veritable torrents. Therefore, however quiet the upper atmosphere and however smooth its sailing, it would be extremely dangerous to attempt to land an aeroplane at such a place and such a time.

Note.—All the above sources of danger, whether near the surface like the breakers, the torrents, and the eddies, or well up like the billows and the wind sheets, are less and less effective as the speed of the aeroplane is increased. But this does not mean that the swiftest machine necessarily is the safest; there are numerous other factors to be considered, and the problem of minimum danger or maximum safety, if the aeronaut insists, can only be solved by a proper combination of theory and practice, of sound reasoning and intelligent experimentation.

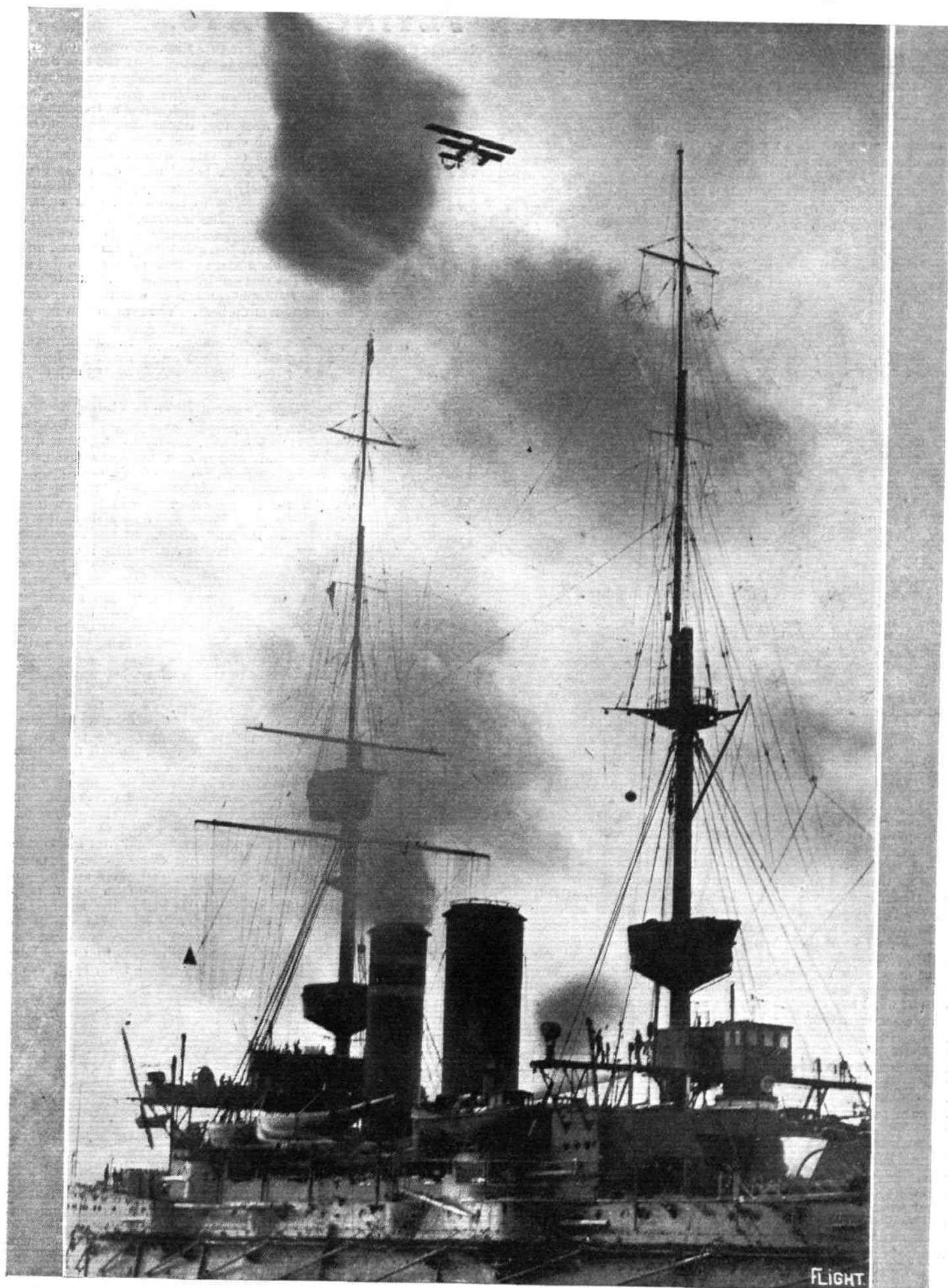
Armament for Airships.

QUESTIONED in the House of Commons as to how many of the new airships were equipped with firing platforms above the envelope for the purpose of attacking aeroplanes, Mr. Churchill said that a suitable armament will be provided, but no technical details could be given.



THE FRENCH HEADQUARTERS SHIP FOR SEAPLANES—THE "FOUDRE."—In this photograph will be noticed the aeroplane hangar on the deck abaft the rearmost funnel. She is now stationed in the Mediterranean at St. Raphael, which adjoins Frejus. In the right-hand photograph is a party of "blue jackets" belonging to the naval station, engaged in a few exercises during an "off" afternoon.

Photograph by Capt. J. C. Halahan.

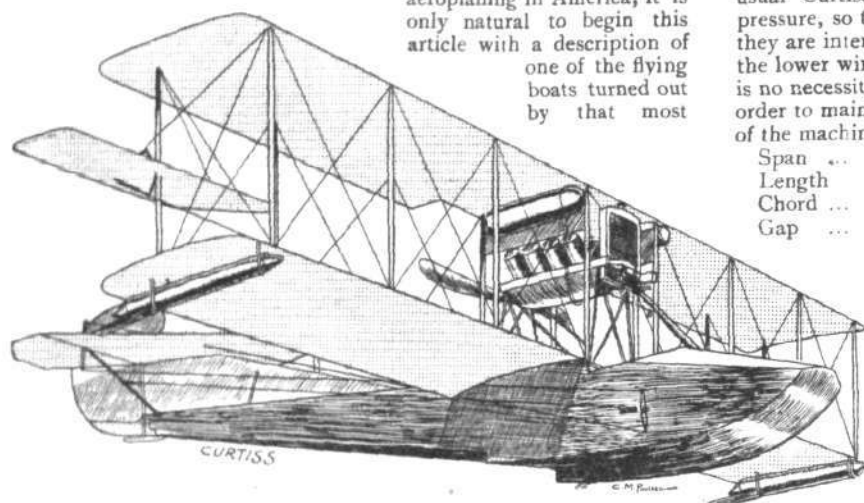


IN THE SMOKE OF H.M.S. "PRINCE OF WALES."—The Navy seaplane, with the First Lord of the Admiralty—Mr. Winston Churchill—on board, following the "Prince of Wales" as she is passing out of Portsmouth Harbour.

SOME AMERICAN FLYING BOATS.

IN view of the announcement that an attempt is to be made during the coming summer to cross the Atlantic in a Curtiss flying boat, and bearing in mind the popularity this type of aircraft has attained in the United States, the following brief descriptions of some of the most successful American flying boats will enable our readers to form some idea of the stage to which this form of hydro-aeroplane has been developed. It is a fairly safe guess that for any attempts made under American auspices machines of the flying boat type will be employed, for in no other country have so many different constructors turned their attention to this particular type.

Since the Curtiss flying boat is the first to be entered, and as moreover its designer, Mr. Glenn Curtiss, is the pioneer of hydro-aeroplaning in America, it is only natural to begin this article with a description of one of the flying boats turned out by that most



The Curtiss flying boat.

versatile constructor, more especially in view of the fact that the Curtiss machines are now being constructed in this country by Messrs. White and Thompson, Ltd., of Middleton, Bognor, Sussex. It is not easy to choose a model for description, for the dope has hardly had time to dry on the planes of one machine before a new and improved one is put through its trials. However, the flying boat built by the Curtiss Company for Mr. Harold F. McCormick, of Lake Forest, Ill., is fairly typical, as it embodies standard Curtiss features as well as several innovations which will be adopted in future machines. The boat, which is 23 ft. 7 ins. long, is built up of longitudinal members of ash 1 in. square, and placed 6 ins. apart, carrying the ribs, which are spaced 3 ins. apart. Over this framework is secured the planking, which for the sides of the boat consists of a thin spruce skin, whilst the bottom is covered with a planking of $\frac{3}{8}$ in. thick mahogany and $\frac{1}{2}$ in. spruce laid diagonally and having a sheet of very thick fabric, set in marine glue, between them. The whole outside of the hull is then covered with watertight canvas. Eight bulkheads divide the boat into watertight compartments, each of which is provided with an inspection door, which permits examination of the interior of the boat. Two of these compartments are claimed to possess sufficient buoyancy to keep the machine afloat should the remaining seven, for some reason or other, spring a leak. The bottom of the boat has a step of rather unusual shape. Instead of the usual box step, the step in this machine is of triangular form when viewed in plan, and has its apex pointed forward. Air is admitted to the step by two $1\frac{1}{2}$ in. copper tubes extending upwards through the hull. From the step the boat slopes upwards in order to facilitate getting off without the rear portion dragging. The body tapers to a vertical knife's edge at the rear, where are mounted the tail planes, consisting of fixed tail planes mounted a short distance above the hull and a divided elevator, hinged to the trailing edge of the fixed plane, a vertical fin and the rudder.

Just in front of the lower plane, and arranged side by side, are the pilot's and passenger's seats. In front of them are the dual controls, which consist of two rotatable hand wheels mounted on a single column, so that the machine can be controlled by either pilot or passenger at will. A to and fro movement of the wheel operates the elevator, whilst rotation of the hand wheel actuates the rudder.

The ailerons are operated by means of the shoulder yoke fitted as standard on all Curtiss machines, but any other control may be fitted. The deck of the boat in front of the occupants is swept upwards to form a wind shield. The gap between the main planes, of which the lower one is mounted on the upper longerons of the

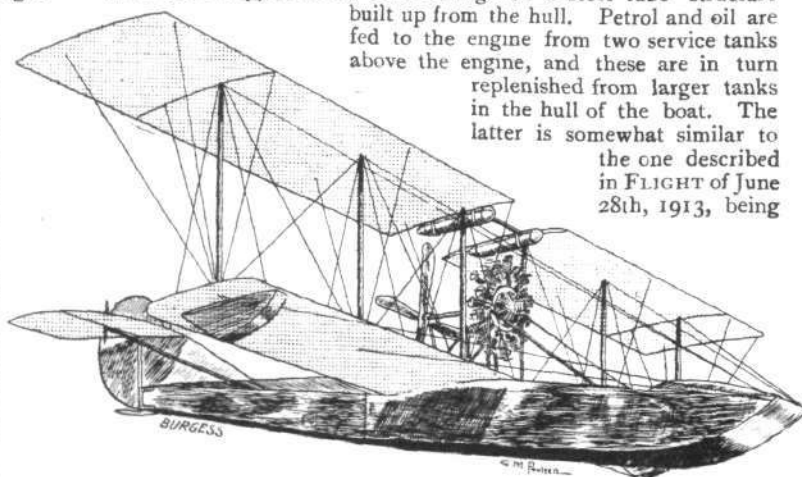
boat, is 5 ft. 6 ins., and the chord is 5 ft. 7 ins. Mounted on very strong bearings between the planes is the engine—a 100 h.p. 8 cyl. Curtiss—driving directly a propeller situated behind the main planes. A very stout oblique strut runs from the front part of the engine bearers to the upswept nose of the boat, and serves to transmit the strains due to momentum from the engine to the boat on alighting. On either side of the engine, and slung from the struts by means of steel straps, are the two tanks which contain the fuel, of which a supply sufficient for a six hours' flight can be carried. Outside the tanks, and immediately under the top plane are situated two blinkers, the object of which is to counteract, to a certain extent, the side area of the boat. The ailerons, which are of the usual Curtiss type, are pivoted approximately at their centre of pressure, so that little or no power is required to operate them, and they are interconnected in such a manner that the drag on that of the lower wing is the same as that on the higher wing, so that there is no necessity to use the rudder in conjunction with the ailerons in order to maintain the direction of the boat. The general dimensions of the machine are:—

Span ...	42 ft. 2 ins.	Area ...	400 sq. ft.
Length ...	23 ft. 7 ins.	Weight ...	1,520 lbs.
Chord ...	5 ft. 7 ins.	Speed ...	53 m.p.h.
Gap ...	5 ft. 6 ins.		

The High-Powered Burgess Flying Boat.

Although in its general arrangement the Burgess flying boat is somewhat similar to the Curtiss, it differs very materially from it both constructionally and aerodynamically. One of the most characteristic features of this machine is the method employed for wing bracing. It will be seen from the accompanying sketch that only a single row of struts separate the main planes. It will be remembered that this method of construction is employed in the Breguet biplane, but whereas in the Breguet the necessary stiffness is provided by springs between the spars and the ribs, in the Burgess this is accomplished by cables running from the leading edge and rear spar of the upper plane to the main spar of the lower plane. This construction does not impress one as being particularly strong, especially in a machine with so powerful a motor as the 220 h.p. Anzani engine installed in this machine, but according to reports the makers do not seem to have experienced any trouble from this source. Each wing is built up on a tubular steel spar $3\frac{1}{2}$ ins. in diameter, a wood entering edge hollowed out for lightness, and a thin wood stringer parallel to the spar. The ribs are of wood, and are placed a foot apart. The upper plane is fitted with 5 ft. extensions, and has a span of 41 ft. 4 ins. The span of the lower plane is 33 ft. 4 ins., and the gap between the planes is 7 ft.

The 20-cyl. Anzani engine is mounted between the planes, and drives directly a four-bladed propeller through an extension of the crank-shaft supported on ball-bearings on a steel tube structure built up from the hull. Petrol and oil are fed to the engine from two service tanks above the engine, and these are in turn replenished from larger tanks in the hull of the boat. The latter is somewhat similar to the one described in FLIGHT of June 28th, 1913, being



The Burgess flying boat.

of the plain non-stepped type. It is built up of mahogany planking over a framework of oak, and is divided by bulkheads into numerous watertight compartments. In order to facilitate shipment, the boat is built in two sections, which can be easily dismantled and erected. The tail planes are similar to those of the machine already referred to, and they, as well as the heel of the boat, are protected by a small tail skid or skeg mounted under the stern of the boat. The pilot's and passenger's seats are arranged tandem fashion, the pilot occupying the rear seat. As the lower plane has been left uncovered

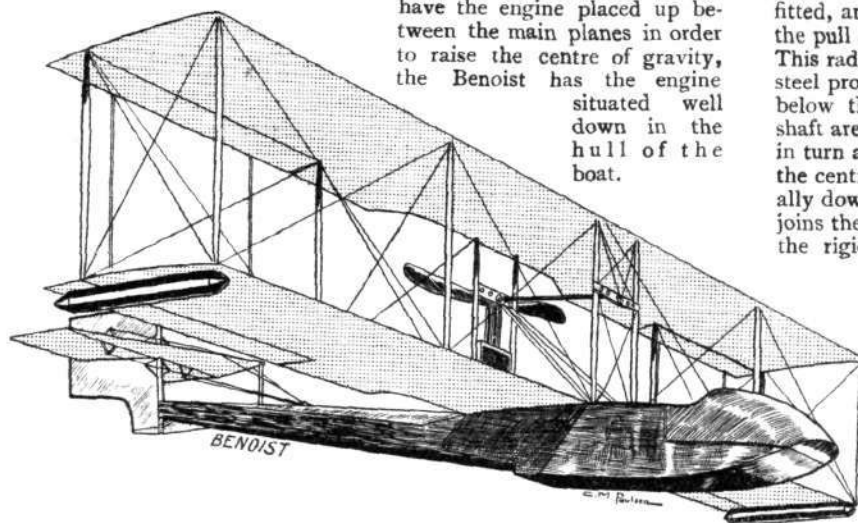
for a distance of about 6 ins. each side of the boat, the pilot has a very good view in a downward as well as all other directions. From the passenger's seat an even better view is obtained. The controls are of the Wright type, consisting of two levers, one of which controls the warp and rudder simultaneously, whilst the other operates the elevator. The general dimensions are:—

Length ...	30 ft. 6 ins.	Gap ...	7 ft.
Span, upper plane	41 ft. 4½ ins.	Weight...	2,050 lbs.
Span, lower plane	33 ft. 4½ ins.	Speed ...	75 m.p.h.
Chord ...	5 ft. 6 ins.	Area ...	373 sq. ft.

The Benoist Flying Boat.

The Benoist flying boat represents an entirely different practice in flying boat design from that employed in the Curtiss and Burgess types. The respect in which the difference is mostly manifest is one of weight disposition, for whilst the two types mentioned above

have the engine placed up between the main planes in order to raise the centre of gravity, the Benoist has the engine situated well down in the hull of the boat.



The Benoist flying boat.

This, of course, gives this machine a comparatively low centre of gravity, and while this may, or may not, be a disadvantage in flight, it certainly renders the craft very stable on the water, and in modern machines, such as the Morane-Saulnier "Parasol," we have seen that a low c.g. is not prohibitive for good flying qualities.

The boat itself, which has a length of 23 ft., is built up of double spruce planking over a skeleton of spruce longitudinals and ribs. In the nose of the boat the bottom is swept upwards in order to assist the boat in getting into its skimming position in the shortest possible time. A single step, 5 ins. high, occurs at a distance of 9 ft. 8 ins. from the nose of the boat, and from the step to the stern the hull slopes upwards as well as tapering to a vertical knife's edge carrying the rudder. The deck is swept downwards very abruptly from the occupants' seats to a point behind the rear plane struts, in order to provide sufficient clearance for the propeller. In front of the seats is a cowl, formed by a structure of spruce stringers

covered with canvas, the purpose of which is to protect the occupants from wind and water spray.

The method of mounting the engine is very interesting, as it serves at the same time to very materially strengthen the boat. Two strong spruce beams running parallel to each other practically the whole length of the boat serve as a support for the engine, and are spaced a distance apart sufficient to take the crank case arm bolts. The length of these beams is 17 ft., and in front of the step and under the engine they have a depth of 16 ins., and a thickness of two ins. From the step backwards they taper gradually to conform to the shape of the hull, and have been carefully proportioned for the various loads. Wherever possible, they have been lightened by hollowing them out. The engine drives through a chain transmission a single propeller situated behind the rear plane struts. The sprockets on the engine-shaft and propeller-shaft are of the same size, so that the gearing is 1 to 1. A tubular steel chain guard is fitted, and incorporated with it is a tubular radius rod which takes the pull of the chain, and provides easy adjustment of its length. This radius rod floats on ball-bearings at both ends. The tubular steel propeller-shaft is mounted between the main planes some 18 ins. below the trailing edge of the upper plane. Both ends of this shaft are carried on large combined radial and thrust bearings, which in turn are mounted on cast bronze retainers strongly supported to the central members of the *cellule*. Spruce struts running diagonally down to the leading edge of the lower plane, where that member joins the *longerons* of the boat, take the thrust reaction and preserve the rigidity of the rear bearing mounting. The propeller-shaft extension is fitted with a transverse pin, so that the engine can be started by the insertion of a starting handle. This operation is easily performed from either of the occupants' seats. The main planes, which are rectangular, as seen in plan, are both of equal span, and are built up in sections to facilitate transport. To the trailing edges of the outer sections of both planes are hinged *ailerons* of 8 ft. length, and a width of 1 ft. 8 ins. Mounted some distance above the deck of the boat is a fixed stabilising plane, to the trailing edges of which are hinged the two elevator flaps. The rudder is hinged to a post forming an extension of the stern post of the boat. A small portion of the rudder projects below the bottom of the boat, and serves as a water rudder when the machine is taxiing on the water. The control levers are situated in front of the left hand seat (the seats are arranged side by side), and consist of a universally mounted lever operating the *ailerons* and the elevator.

Another lever actuates the rudder by a to-and-fro movement. The fuel tanks are placed in the hull on one side of the engine, and have a capacity for at least four hours' flight. All control cables are in duplicate, and are carried inside the hull, from which they emerge through a brass ferrule in the crown of the after deck.

The general dimensions of the Benoist flying boat are:—

Span ...	35 ft.	Length of hull ...	23 ft.
Chord ...	5 ft.	Weight, empty ...	1,190 lbs.
Gap ...	6 ft.	Speed, fully loaded	64 m.p.h.
Length ...	26 ft.		

(To be concluded next week.)



"PROPELLERS"—THE DISCUSSION.

In opening the discussion on Mr. Bramwell's paper at the recent meeting of the Aeronautical Society, Mr. North commented upon the fact that Chauviere had said that the quality of the wood and other factors caused a variation of as much as 3 per cent. in the propeller efficiency.

Mr. Holdberg retailed some of his experiences with model propellers, and remarked that although in static tests with two propellers, the acting face of one being inclined forward, while that of the other leaned towards the rear, he had found considerable differences in their performances, yet in actual flight on model aeroplanes their efficiencies were practically equal. He said that he had obtained some very excellent results with propellers made simply by steaming the trailing edge.

Mr. Low congratulated the author upon his remark that the only essential in using the equations given in his paper was that the units employed must be consistent among themselves. He thought that it would be a great advantage if the results of the investigations recorded in the Report of the Advisory Committee for Aeronautics were detailed in some consistent system of units. Mr. Bramwell had drawn attention to some values of the variation in pitch for zero thrust taken from the Koutchino Laboratory Bulletin, which showed a variation of 2.5 per cent. between the successive readings given; he would like to say that this variation seemed to increase

with speed and indicated that the pitch for zero thrust was an increasing function of the angular velocity of the propeller.

Dr. Glazebrook said that he thought Mr. Bramwell had given a very excellent paper. One of the reasons why the N.P.L. had undertaken experimental research on propellers was that there was not a great deal of money available for that purpose amongst private manufacturers, and he commented upon the excellent results which had been obtained with propellers of even the crudest design. He observed that the units employed in the Report of the Advisory Committee were those which he had been informed would be of the greatest value to the industry, but he would very much like to see a consistent system adopted. Dr. A. P. Thurston, after pointing out the differences in the mode of progression between an aerofoil and a propeller blade, asked the author whether any experiments had been made as to the improvement that might be obtained by the use of baffle plates, such as had been already employed in marine work.

The author, in his reply, said it was sometimes disheartening to find such remarkable efficiencies given by some propellers, and was not at all surprised that propellers made in the manner mentioned by Mr. Holdberg had done so well. He stated in reply to Dr. Thurston that so far they had not undertaken any such work, but had endeavoured to keep the propeller as free as possible from the effects produced by baffling or disturbing surfaces.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL DINNER.

In consequence of the First Lord of the Admiralty having been commanded to dine with H.M. the King on the 27th inst., the Royal Aero Club Dinner fixed for that date, at which Mr. Winston Churchill was to be the principal guest, has been postponed until **WEDNESDAY, MARCH 4th.**

The Royal Automobile Club not being available on that date, the Dinner will be held at the **SAVOY HOTEL, 7.30 for 8 o'clock.**

The Marquess of Tullibardine, M.V.O., D.S.O., M.P., the Chairman of the Club, will preside.

Annual General Meeting.

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on **Tuesday, March 24th, 1914, at 4 o'clock, at 166, Piccadilly, London, W.**

Notices of motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the meeting, and must be signed by at least five members. **Wednesday, March 4th, 1914, is the last day for the receipt of notices of motion.**

Committee.

In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the committee are:—

Col. J. E. Capper, C.B., R.E.	A. Mortimer Singer.
G. B. Cockburn.	T. O. M. Sopwith.
Maj. J. D. B. Fulton, C.B., R.F.A.	The Marquess of Tullibardine,
J. T. C. Moore-Brabazon.	M.V.O., D.S.O., M.P.
Com. C. R. Samson, R.N.	Roger W. Wallace, K.C.

Col. J. E. Capper, C.B., R.E., does not offer himself for re-election.

The following members have so far been nominated:—

G. B. Cockburn.	Robert Loraine.
Maj. J. D. B. Fulton, C.B., R.F.A.	Fred May.

Com. C. R. Samson, R.N.

A. Mortimer Singer.

T. O. M. Sopwith.

The Marquess of Tullibardine,
M.V.O., D.S.O., M.P.

Any two members of the club can nominate a member to serve on the Committee, having previously obtained such member's consent. The name of such member so nominated, with the names of his proposer and seconder, must be sent to the Secretary in writing not less than fourteen days before the Annual General Meeting. **Wednesday, March 11th, 1914, is the last day for the receipt of nominations.**

Members are reminded that a ballot paper for the election of nine candidates to seats on the Committee of the Club will be forwarded to them at least seven days before the date of the Annual General Meeting.

Gordon-Bennett Aviation Cup.

The following entries have been made to the Royal Aero Club:—

Messrs. A. V. Roe and Co., Ltd.	Manchester.
Sopwith Aviation Co., Ltd.	Kingston-on-Thames.
British and Colonial Aeroplane Co., Ltd.	Bristol.
Cedric Lee Company	Shoreham (two machines).
Messrs. Vickers Ltd.	Erith and London.

The Race will be held in France in September or October next, and the Royal Aero Club will select from the above entries three competitors to represent the British Empire.

The date for receiving entries is now closed.

Garros Hamel Match.

This match which took place on Sunday last at Juvisy, and a report of which will be found elsewhere, attracted quite a large number of Members of the Club to Paris, including Lord Edward Grosvenor, Mr. Harry DelaCombe, Mr. A. Huntly Walker, Mr. Warwick Wright, Mr. A. Stern, Mr. W. E. de B. Whittaker, Eng.-Lieut. Wilfred Briggs, R.N., Mr. P. Maréchal, and Mr. Harold Perrin (Secretary).

Mr. Harry DelaCombe and Mr. Harold Perrin represented the Royal Aero Club on the Committee which had charge of the arrangements for the match.

166, Piccadilly, W.

HAROLD E. PERRIN, Secretary.



✓ The First Lord of the Admiralty in Navy Seaplane No. 95 in Portsmouth Harbour prior to his ascent last Monday.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

MONDAY, last week, dull but calm, fine day for flying, the Naval pilots taking full advantage of it, most of their machines being up. Lieut. Davies first on Sopwith, then on B.E., arriving home with engine at quarter throttle. Lieut. Briggs on 80 h.p. Blériot, 80 h.p. Caudron, flying well. Com. Samson solo and with passenger on 80 h.p. H. Farman; another Sopwith also up; and 70 h.p. Short with and without passenger. All machines were out in the afternoon. Com. Samson on new B.E., and climbing at half throttle. The 50 h.p. Avro seems marvellously efficient, and flies far better than some of the machines of greater horse-power.

Machines up all day Tuesday, including B.E., Bristol, 50 h.p. Avro, 2 Sopwiths, 80 h.p. Deperdussin, 80 h.p. Blériot, H. Farman, 2 Short biplanes, and M. Farman.

Wind and rain cleared up Wednesday about mid-day, when Com. Samson had Short 3 out, and Lieut. Briggs on the 80 h.p. Blériot.

Very windy and wet Thursday. Sopwith and Short machines only out.

Friday, fair. Lieut. Andrews left for Dover with passenger on Short biplane; when over the Swale at about 4,000 ft., the petrol pipe broke, and a forced landing was made at Harty. Having repaired same, he returned to the aerodrome and restarted. He reached Dover more or less uneventfully, but when over Dover, thinking the engine was failing, he landed. He again ascended alone to try the engine, but when turning on the top of St. Margaret's Hill, he stalled the machine and side-slipped, the tail and wing hitting the ground, the machine turning completely over. The pilot luckily escaped unhurt. B.E., 2 Shorts, H. Farman, Sopwith 2 flights, Blériot 2 flights in afternoon.

Saturday it was squally. Lieut. Courtneidge left for Portsmouth with passenger on 80 h.p. Sopwith, but returned after reaching Maidstone owing to bad weather. 80 h.p. Blériot and 2 Shorts also up. Sunday, wind and rain. No flying.

Civilian Flying.—Monday last week, Mr. Gordon Bell up with passenger on new side-by-side 100 h.p. (9-cyl.) Gnome-Short

biplane. The Hon. M. Egerton made three good flights on his 50 h.p. Short biplane.

Mr. Gordon Bell again up Tuesday on 100 h.p. Gnome-Short biplane, with Mr. Fairey as passenger. The 80 h.p. Dunne biplane up with Mr. Percival as pilot, flying circuits. In landing, unfortunately, broke wing skid. Up again in afternoon with passenger, Mr. Pitt, in a very bumpy wind, but she was beautifully stable and Mr. Percival had perfect control.

Thursday, Mr. Gordon Bell up on 100 h.p. sociable Short (three flights), with Mr. Fairey as passenger, once in pouring rain.

Mr. Gordon Bell up Friday on 100 h.p. sociable.

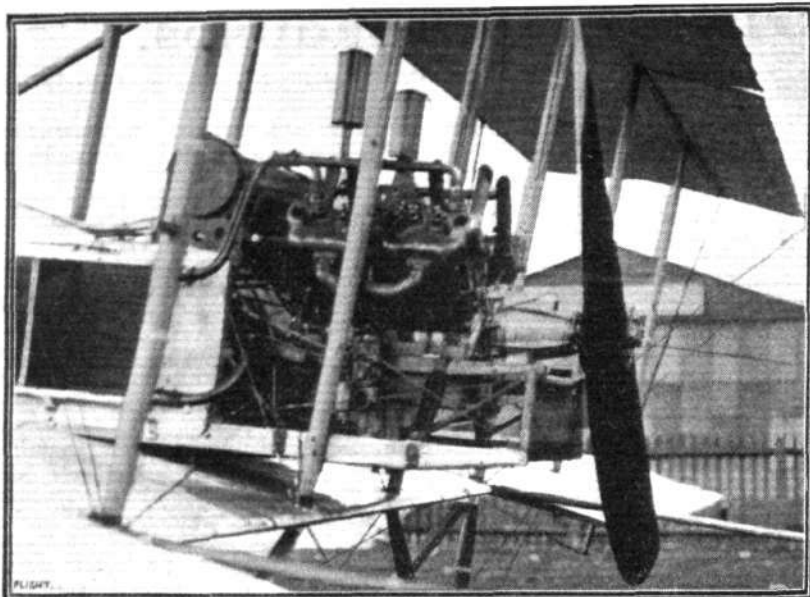
Brooklands Aerodrome.

ON Monday last week with the wind varying between zero and up to only 12 miles an hour, a lot of flying was done. The Bristol and Vickers Schools were busy, two pupils from the latter, Lieut. Crosbie (remainder of test), and Lieut. Binney (full test; up to 1,000 ft. for altitude) passing their *brevet* tests in good style. Mr. Dukinfield Jones went up to 5,200 ft. on his Flanders biplane. Mr. Barnwell was out on the Vickers gun-carrying biplane. Mr. Alcock went to Staines Reservoir and back on the Maurice Farman (100 h.p. Sunbeam) biplane, reaching an altitude of 2,400 ft. Mr. Pixton had the new "tweenie" Sopwith biplane (100 Gnome) ordered by the Admiralty out for the first time, the machine flying right away without any adjustments. In the afternoon the new Martinsyde monoplane (with Lieut. Blatherwick as a passenger) went up to 3,600 ft. Mr. Dukinfield Jones was out again on the Flanders biplane with and without passengers. Herr Koempler was flying the D.F.W. biplane. Mr. Alcock was again out on the Maurice Farman biplane with Mr. Coatalen as a passenger. Mr. Barnwell was out on the Vickers gun-carrier. At the Avro School, the new 50 h.p. Avro ordered for the Admiralty arrived, as also the 100 h.p. A.B.C. Avro., this being the first A.B.C. engine turned out by Messrs. Armstrong, Whitworth. Mr. Alcock took Lieut. Blatherwick on the Maurice Farman. Mr. Pixton, with Lieut. Spencer Grey as a passenger, put the "tweenie" Sopwith biplane through an



Mr. J. Alcock, on the Sunbeam-engined M. Farman, about to make a flight at Brooklands Aerodrome.

"Flight" Copyright.



"Flight" Copyright.

The Sunbeam engine power plant on the Maurice-Farman at Brooklands.

excellent hour's test, which was passed with a big margin to spare. Mr. Richard P. Creagh passed his *brevet* tests, reaching 500 ft.

The wind variation was up to 34 m.p.h. on Tuesday. The Vickers pupils were busy. Mr. Dukinfield Jones was flying with the Flanders biplane, both solo and with passengers. M. Marty, with a passenger, arrived from Hendon on a 50 h.p. Le Rhone-engined Morane-Saulnier, and returned to Hendon after a short stay.

On Wednesday the wind was blowing up to 30 m.p.h. The Vickers and Bristol schools were at work in the morning. Mr. Alcock took the Maurice Farman biplane up to 4,500 ft., carrying several passengers at different times. Mr. Raynham was on the 80 h.p. Avro, going to 4,500 ft., with Lieut. Blatherwick as a passenger. Mr. Dukinfield Jones made several flights on the Flanders biplane. There was less wind on Thursday, the variation being from zero to 18 m.p.h. The Bristol and Vickers pupils were busy. Mr. Alcock took Lieut. Blatherwick to 2,500 ft. Mr. Llan Davies'

50 h.p. Avro biplane arrived. In the afternoon Mr. Raynham was testing the new 50 h.p. Avro biplane ordered by the Admiralty. Mr. Pixton was out on the "tweenie" Sopwith biplane, which was then handed over to Lieut. Spencer Grey. Mr. Alcock on the Maurice Farman went to 1,500 ft. Mr. Barnwell took a pupil on a Vickers biplane, but the weather was too bad for much tuition.

On Friday the wind was distinctly gusty, as much as 41 m.p.h. being recorded; consequently no school work was possible. Mr. Jones attained an altitude of 3,000 ft. in a 20-mins. flight on the Flanders biplane. Mr. Alcock took a passenger up to 2,300 ft.

The weather was stormy and wet on Saturday. Mr. Raynham was out several times testing the new Admiralty 50 h.p. Avro. Mr. Jones made one or two flights on the Flanders biplane, and Herr Roempler was out on the D.F.W. biplane.

On Sunday, in spite of a strong wind, three machines made a number of flights. Mr. Alcock was first out on the Maurice Farman, followed by Mr. Barnwell on the new Martinsyde monoplane (on which the winner of the ballot for the free passenger flight—Capt. Gibbons, of Pine Grove House, Weybridge—had a trip), and Mr. Jones, who made a couple of flights in a bumpy wind on the Flanders biplane.

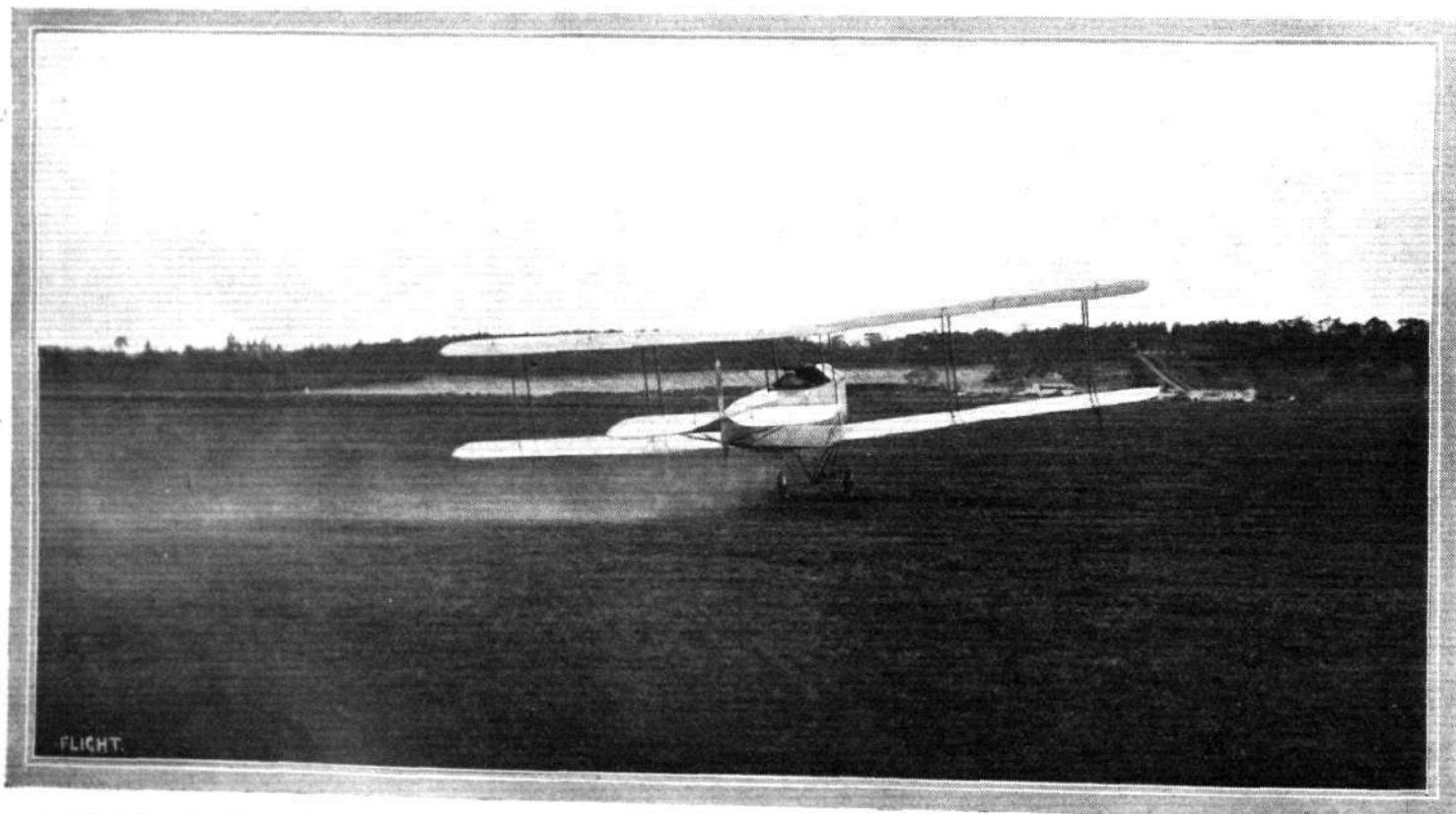
Bristol School.—Monday, last week, Halford with Lieut. Binney for a test flight, this pupil then taking over the machine and making several solo straights and circuits. Halford again with same pupil, who followed with some more solos, after which he went for his certificate, which he gained, flying at a height of over 1,000 ft.

No flying during the day, Tuesday, owing to high wind. Wednesday, the wind dropped about five o'clock, when Halford took Lieut. Fraser for tuition. This pupil continued on solos until dusk stopped tuition. Thursday, Halford with Lieut. Fraser, who followed with several solos. Halford tested a new machine, which was then handed over to Lieut. Fraser, who made his first solo circuit.

Lieut. Fraser as passenger with Halford, Friday, then flying numerous straights, circuits, and figures of 8 solo, after which the wind stopped further tuition for the day.

No tuition possible Saturday, owing to high wind all day.

Vickers School.—Monday, last week, Instructors Elsdon and Knight with Messrs. Creagh and Spencer-Warwick, also with Lieuts.



OFF FOR EASTCHURCH.—Mr. Raynham starting away from Brooklands on Monday to deliver a 50 h.p. Gnome-Avro to the Admiralty at Eastchurch.

"Flight" Copyright.

Crosbie, Jackson and Mansergh, and Capt. Ross Hume. Barnwell with Mr. Hurst. Lieut. Crosbie for second half of *brevet* tests. Mr. Barnwell on gun-carrying biplane. Lieut. Jackson solo on biplane, also Mr. Creagh, latter then for *brevet*.

Tuesday, Knight and Elsdon on biplanes with Lieut. Mansergh and Capt. Ross Hume.

Knight with Capt. Ross Hume on biplane, Wednesday, pupil then for solo. Lieuts. Jackson and Mansergh and Mr. Spencer-Warwick, solos. Thursday, Lieut. Mansergh solo on biplane. Capt. Ross Hume solo. Elsdon with Lieut. Jackson and Capt. Ross Hume.

Lieuts. Jackson and Mansergh, Capt. Ross Hume and Mr. Spencer-Warwick solo on biplane, Friday. Barnwell with passenger.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday, last week, Messrs. Howarth, Lillywhite, Norris, Bjorkland, Clarke and Strange, solo circuits, &c. Lieut. Lindop and Messrs. Parker and Grahame, circuits with Mr. Birchenough. Mr. Stewart straights in Blériot with M. Marty. Mr. Clarke afterwards going in for *brevet* tests.

Messrs. Bjorkland, Lillywhite, Howarth and Norris, solos, circuits, &c., Wednesday. Messrs. Grahame, Barrs, Moore, Parker and Lieut. Lindop, circuits with Mr. Birchenough or Mr. Strange in the passenger seat.

Saturday, Mr. Norris, circuits with Instructor Cripps; Mr. Lillywhite solo circuits. Mr. Tapp and Prince Sapieha (new pupils), rolling with instructor and alone.

W. H. Ewen School.—On Monday, last week, school was out from 9 a.m. to 11.30 a.m., and from 3 p.m. to 4.30 p.m. Mr. Goodden test flight on 35 h.p. Caudron No. 1, Mr. Banks Price half-circuits, and Mr. Wiggitt rolling.

The wind was too high on Tuesday for pupils' practice. Mr. Goodden made a fine flight on the 45 h.p. Caudron, lasting 30 mins.

On Wednesday the pupils were out from 4.45 p.m. to 5.20 p.m. After a test flight by Mr. F. W. Goodden on the *brevet* machine, Mr. Banks Price did straights. On the 35 h.p. Caudron No. 1, Mr. Curtis rolling.

Hall School.—Monday last week, in morning, Messrs. A. F. Arcier, A. L. Brookes, H. Gearing, 4 straights each. Meantime, L. Edgecombe Palmer made his first flight with J. L. Hall on Avro. H. Gearing had the misfortune to get stuck in recently excavated sewer at far end of ground, and made an upside down stunt unintentionally. H. C. G. Allen, who had previously made half a

dozen good straights, was despatched to scene on 35 h.p. Blériot. Nothing however was damaged, owing to strong construction of machine. In afternoon Messrs. H. Gearing, A. L. Brookes, L. Edgecombe Palmer and A. F. Arcier, 4 straights apiece. In meantime, J. L. Hall, with Allen as passenger, flew over on Avro to Ealing, and returning later at a very high altitude, descended in a long spiral *vol plané*. In evening several passengers were carried.

As soon as mist cleared away, Tuesday, Messrs. Arcier, Gearing, Brookes and Edgecombe Palmer, rolling and straights about 4 times each. Later J. L. Hall flew over to Acton, but got caught in a squall, and decided not to continue on to Brooklands. Wednesday, wind and rain, but in evening, during temporary calm, H. C. G. Allen made some good straights, one with a graceful landing.

Thursday in morning, A. L. Brookes and H. Gearing 10 straights, both leaving ground at intervals. In afternoon, in pouring rain, a Mr. Finch was taken for a flight.

Messrs. A. F. Arcier, H. Gearing, A. L. Brookes and L. Edgecombe Palmer, 2 straights each, Friday morning before gale terminated school work. Saturday and Sunday, wind and rain.

Salisbury Plain.

Bristol School.—Voigt took Mr. Stutt for a passenger flight, Lieut. Barratt five flights, Capt. Walcot five flights, and Lieut. Harman one flight Monday, last week, after which the latter made his first solo, followed by Mr. Stutt. In the afternoon Voigt gave tuition to Capt. Walcot, Lieut. Barratt, Lieut. Myburgh and Lieut. Bolitho. Solos were made by Lieut. Harman and Mr. Stutt.

Tuesday, Jullerot and Voigt testing, the former then going out on the tractor biplane and the latter on the school biplane giving tuition to Capt. Walcot, Lieuts. George, Myburgh, Barratt and Bolitho, also Mr. Hay. Wind then stopped further work.

Sippe took Mr. Stutt for a trip on the tractor, Wednesday, but the wind was too high for any further tuition to be given.

Thursday, Voigt flying solo, afterwards giving tuition to Lieut. Myburgh. Jullerot took Lieut. George for tuition, but found conditions too bad for further flying.

No flying possible Friday, owing to wind and rain all day, and Saturday Voigt took Mr. Stutt for one flight, and Capt. Walcot for two flights. Mr. Stutt then made a solo in bumpy weather, after which no further flying was possible until late in the afternoon, when Capt. Walcot received four long tuition flights, and Mr. Stutt made four long solos with figures of 8.

BRITISH MILITARY AVIATION.

ON Wednesday, the House of Commons went into Committee of Supply on the Army Supplementary Estimates, with Mr. Whitley in the chair. On the Vote of £196,000* for aviation, supplies and clothing,

Col. Seely (Secretary for War) explained that one of the main causes of the necessity for the Supplementary Vote was the necessary addition to the military aeronautical service. With regard to aeronautics, the Committee might well ask him to justify under-budgetting for a considerable sum. In a science so rapidly advancing it was not possible to forecast with accuracy what the demands might be. He believed that every other country interested in military aeronautics had found it necessary to make further provision owing to the growth of knowledge of aeronautics, and we had followed suit for similar reasons. There was, however, one reason for the increased vote which did not apply to other countries—namely, the transfer of the airship squadron of the Military Wing of the Royal Corps to the Navy Wing. It might be asked how the transfer involved a Supplementary Vote for the Army. The reason was that for the purposes of the transfer the airships and their plant were valued at £65,000, though, of course, no actual cash transfer took place between one Government department and another. But it would not have been proper for him, having obtained the sanction of the House to eight squadrons for the aeronautical service, to have reduced that number to seven, and therefore orders were given to put in the place of the airship squadron a squadron of aeroplanes, which were considered more suitable for Army purposes and Army administration and management. He consequently gave orders for the immediate provision of the necessary aeroplanes when the transfer was effected. These aeroplanes were all of a special type and designed for a special purpose. They were being constructed at the Royal Aircraft Factory, and would shortly be ready. There would be three flights of them, and he believed they would be of value to the Military Wing of the Royal Flying Corps.

The reason why they decided to transfer the airships from the Military Wing to the Naval Wing was that, in the progress of aeronautics, it became apparent that we must have not only more airships for the United Kingdom, but larger airships. Our military airships were remarkably efficient for their size, but as the science advanced it became evident that they would undoubtedly be at a disadvantage for various technical reasons owing to the great growth in the size of other airships. The question then was, should both the Navy

and the Army take on this formidable business of increasing our lighter-than-air fleet, or should it be done by one Department? It seemed to them quite clear that in a matter of this kind, where they had one service, it was much better, if it could possibly be arranged, that it should be managed by one Department. The question was, which of the two Departments should manage the airship service. It seemed to him and those he consulted that without doubt it was more akin to the Navy to navigate great airships than to the Army. That did not mean in the least degree that our military officers had shown themselves incapable of managing our airships, for the exact contrary was the case. Whatever view might have been held with regard to the inadequate number we had, he thought there was general agreement that the record of our military officers who navigated airships was remarkable, both in regard to skilful navigation in what was the most difficult country for aerial navigation, and also for the quite astonishing absence of serious accidents either to the men or to the balloons themselves. That had been recognised by the First Lord of the Admiralty, in that he had given posts of great importance and responsibility in the airship service to those officers of the Military Wing who had transferred to the Navy Wing. Nor did it mean that the Army had finally decided that it did not require airships at all. That might well be the conclusion in years to come; it was not the final conclusion now. The difficulties of providing airships for an expeditionary army like ours, which must needs cross the sea, were very great, but were not perhaps insurmountable. Therefore, what this arrangement meant was that the Navy would hold at the disposal of the War Office such a number of airships, if any, and of such a character, as it might be decided the Army required for military purposes.

He believed that this division of functions would tend greatly to efficiency. The Army had devoted, and would continue to devote, its whole efforts to the heavier-than-air service. It might be asked what was this division of functions to which he had referred. No such statement could, of course, be final, but as at present advised the Government were of opinion that the proper division should be as follows.

The Naval Wing of the Royal Flying Corps should be responsible for the whole of the lighter-than-air, that was the airship, service. The Military Wing should be responsible for the whole of the heavier-than-air, that was the aeroplane, service, with the exception of the seaplanes, which seemed to be more suitable to the Navy.

These seaplanes would be specially designed to operate in conjunction with ships and in the neighbourhood of naval bases and ports and other naval purposes which could be best described by

* The supplementary amount in the Army Estimates for aviation is £216,000—there being a sum of £100,000 to be deducted off the gross supplementary estimate of £296,000 in respect of appropriations in aid.

Mr. Churchill when, as he (Col. Seely) anticipated, he would be obliged to come to the Committee for a supplementary sum for the air service for his department. Speaking as the Chairman of the Air Committee, which had both services under its purview, he thought it was almost certain that this country was ahead of all other nations in its development of the seaplane. The other reasons for the supplementary vote were that it had been found necessary greatly to increase the number of spare parts, to increase the number of new aeroplanes, and to create an inspection department. The change of policy with regard to airships was in the direction of efficiency and safety. Other nations thought it desirable to keep the number of their airships secret. His Majesty's Government saw no advantage in so doing, at any rate so far as the aeroplanes for the squadrons and for the Central Flying School were concerned.

When he addressed the House on July 30th last they had 113 aeroplanes. Since that date they had struck off 52 of the older machines, and added 100 new aeroplanes, and therefore the present total was 161. He thought it was right to strike off such a large number—no other nation had done anything so drastic—in view of the great probability that risks to life and limb of the officers and men of the Royal Flying Corps would be minimised. Since July 30th the Military Wing of the Royal Flying Corps had flown well over 100,000 miles, taking part in military manoeuvres over very difficult country. Excluding Saturdays and Sundays, which were not flying days, though in fact, flying often took place on Saturdays, there had only been six days on which flying had not taken place, and he was glad to say that during the whole of that time there had not been a single fatal accident to an officer or man. He regretted that there had been an accident to an officer under tuition, and a very sad accident to a civilian engaged in experimental work two days ago. So far as he had been able to ascertain, there had not been a single case of breakage of any main part of a machine in the air. One of the reasons for that was that a factor of safety had been insisted upon which was far higher than was the case in any other country. That was justified, not because they were more fearful of risks, but because they thought they ought not to take risks if no useful purpose was served, and also because this was a more difficult country to fly in than any of the Continental countries owing to the stronger winds and broken nature of the country. The absence of accident was due also in a large measure to the pilots, whose skill and daring had been acknowledged by all who had investigated the work of the aeronautical branch. The creation of the inspection department was part of the scheme for securing safety by testing every part of the aeroplane during manufacture. He was glad to say that with this Supplementary Vote, and with the provision which would be made in the Army Estimates, the Government would be able to complete the whole of the eight squadrons in men and machines by the end of the coming year. That meant that the country would require 250 aeroplanes—50 for the Central Flying School and 200 for the Military Wing. They had come to the conclusion that if the country required ten aeroplanes ready at any given moment they must have 20 in their possession. Therefore, 200 were required in order to have 100 ready at any given moment. The great majority of the machines were biplanes. It was a great mistake to suppose that biplanes were slow and that monoplanes were fast. They reckoned from experience that they could not count the life of an aeroplane more than two years. Therefore every year the War Office must replace one-half, or 125 of the 250 aeroplanes. Of the 100 aeroplanes obtained since July 30th he believed that 13 were obtained from abroad, and 87 in this country. Quite apart from any question of the relative merits of trading abroad or at home, it was undoubtedly necessary to get all warlike materials whenever possible within our own borders. He had satisfied himself that the condition of the industry was such now that we could quite easily get in this country all the aeroplanes we wanted to maintain the present standard and a great many more.

With regard to engines, a competition was to be held in the near future, with considerable prizes and orders to the amount of nearly £50,000 for a British-built engine. He could not prejudge the result of that competition, but he knew enough about what had been done to be able to say that we could also get all the engines required in this country within a very short time. The problem of getting aeroplanes and engines sufficient for our needs in this country was, in his judgment, solved. It was proposed that much the larger proportion of the Army aeroplanes should be constructed by firms, and the smaller proportion would be constructed, as it had been constructed lately, by the Royal Aircraft Factory, which would be thus left free to do work that was more important, namely, the construction of experimental machines of a special type, the details of which we did not wish to become known, and also repairs, which they could do very well at the Factory. He might be asked how it was that for the provision of a comparatively small number of aeroplanes, namely, 250, money amounting to many hundreds of thousands of pounds was necessary. The reason was that these machines must be regarded not as birds with a little mechanical power added, comparatively

cheap as they were when the great pioneers of this industry, the Wright Brothers, first flew. They were now more like a modern high-power motor car, only much more expensive. The size and power of the engines increased daily. The average speed of the aeroplanes now in our possession was 65 or 66 miles an hour, a speed much greater, so far as his knowledge went, than the average speed of the aeroplanes of any other country. That meant high engine power, and, as anyone who owned a motor car knew, an engine of 80 to 100 h.p. was most expensive. Such an engine wore out far more rapidly in an aeroplane than in any motor car on the road. Then, again, every aeroplane must have two mechanics constantly attending to it. For all these reasons it could not be said that the War Office had been other than wise and economical in their management so far as it was possible to save money in a concern where every saving in strength or material might be an added risk to human life. He might be asked why this aeroplane service was required at all or why it should be such a big one. It was quite true that the proposals which he was putting before the Committee would give us an aeroplane service much larger in proportion to the size of our Army than that possessed by any other Power, but it was wise that such should be the case. Our Army was very small, and for that reason in matters of this kind it was well to be equipped on a greater scale.

Of the value of an aeroplane service there could be no doubt whatever. The range of vision from an aeroplane was astonishing. One was sometimes told by those who did not understand the subject that if a man in an aeroplane was near enough to the ground to see what was below him he would be brought down by the guns or rifles of the enemy. That was a complete delusion. At the height of 5,000 ft. one could see quite clearly on an ordinary day every detail of the landscape, not only roads and hedges, but whether there were two horses or one horse in a cart or wagon, and men could be seen walking along the streets of a town. How easy, therefore, was it to see what troops there were. In these circumstances he thought that military opinion would be disposed to share the view that if an army without aeroplanes was faced by an army with aeroplanes, and if things were anything like equal in other respects, the commander of the army without aeroplanes was doomed. He could not escape. Every movement except at night or in fog or in dense woodlands would be recorded. All this they saw in the manoeuvres last autumn, and it would be still more marked in actual warfare. In manoeuvres it was easy to have recourse to little *ruses de guerre*, such as hiding under hedges or blankets, and, as one general said, "making a noise like a mushroom." But these things could not be practised in war when there was always the element of hurry and haste to avoid disaster. Therefore it seemed clear that every large movement of troops in future would be absolutely known unless conducted in the dead of night or in dense fog or in thick woods. Whatever view hon. members might take of armaments generally, he felt sure that they would not like to see this country left behind in a matter of this vital importance. He honestly believed that the efforts made by the officers conducting the aeronautical service had been successful. We had pilots as good as any in the world—he believed that our aeroplanes were not less in number, they were certainly faster, much younger on the average, and more airworthy than those of other Powers. On the whole, we had made satisfactory progress; he hoped that we should make still further progress in the years to come, and he believed that we were now in possession of a military aeronautical service not unworthy of the British Army.

Mr. Joynson-Hicks, while conceding that the statement just made by Colonel Seely was more satisfactory than his previous statements on the subject, thought that the right hon. and gallant gentleman was not justified in appropriating all the plums to himself and describing our Army aeroplanes as being better than those of any other army in the world. It was certainly not desirable in our own interests that such statements should be made. He assumed that the officers of the inspection department would be independent of the Royal Aircraft Factory, and would inspect that factory with the same assiduity as they would private aircraft factories. Further explanation was needed as to why airships were no longer wanted in the Army. If an expeditionary force left this country for a European country, it would be at a time when the Navy also was at grips with the enemy. If the Secretary for War applied then to the Navy for a number of airships for the use of the land force, the Admiralty would, it was more than probable say: "We are very sorry. The protection of these shores is the first duty of the Navy. We must use our airships to compete with those of any foreign country coming here." Only nine months ago the right hon. gentleman made it perfectly plain that the Army did need airships, for he said that they had decided that the Army should have small dirigibles which could be packed in a box and sent wherever they were required. At the present time we did not possess such craft. Small airships would be very useful in Somaliland or

on the North-West frontier of India in stopping raids. Both the French and the German armies had airships and were using them to an extent which would place our Army, if it were not also equipped with airships, at a great disadvantage. The number of airships possessed by Germany was 14, and by France seven. What were the negotiations between the Army and Navy before this change of policy was adopted, and had the right hon. gentleman any trouble with the Army Council in connection with the matter? There had been another remarkable change of front on the part of the Secretary for War. During the last 18 months the right hon. gentleman had given assurances that it was not his intention to manufacture aeroplanes at the Royal Aircraft Factory, and the statement had gone forth to the private manufacturers that they would not have to compete with the Government in this direction. It was of enormous importance to have here, as they had in France and Germany, a sufficient number of manufacturers who were prepared to supply aeroplanes for the use of the country. It was to be remembered that practically the only market for such machines was the Army and Navy. Yet within a year the number of men employed at the Royal Aircraft Factory had been increased from four or five hundred to about a thousand, and the right hon. gentleman admitted recently that he had, without giving notice of change of policy, issued an order for the manufacture of 24 aeroplanes at the Royal Aircraft Factory. He was not saying that it was not desirable to have a State aircraft factory, but it was only fair to other aeroplane manufacturers in the country that they should have full and definite knowledge of that fact. He suggested that the Secretary of State should give particular attention to the production of an English engine. In time of war we would not be able to get foreign engines, and it was essential to the well being of the aeroplane force that we should get an English engine. He did not wish to revive the controversy of last year as to the number of efficient aeroplanes possessed by the War Office. All he would say was that the figures which the right hon. gentleman had given to-day proved conclusively that he had not 100 efficient aeroplanes in the month of July last. Included in the list which the right hon. gentleman took credit for were 28 monoplanes. Between the rising of the House in August last and the following Christmas the whole of these were knocked off the War Office list. The right hon. gentleman ought not to have kept telling the House all last summer that he had a certain number of efficient aeroplanes, including these monoplanes, when he knew that as soon as the House rose he would knock these 28 machines off the list. The right hon. gentleman has now made the significant admission that for every working aeroplane there should be a spare one in dock. He had said we had 161 aeroplanes. That meant that we could not put more than 80 machines in full working order in the air at any moment, and he (Mr. Joynson-Hicks) doubted if any of the air squadrons could take the field up to full strength and fully equipped with transport, spare parts, &c. The House should take note of the strides made by Germany in the last twelve months with regard to her military aeroplane service. To-day she held records for flight distance for the whole world. During the last few months one German military aeroplane had been up for 16 hours 20 minutes in a non-stop flight; another had been up for 16 hours and 1 minute; and a third for 14 hours and 7 minutes. The right hon. gentleman knew that we had no aeroplane which could do the same. While the aeroplane service had considerably advanced during the last six months, the Government did not sufficiently realise the vital importance of that service being equal to any other in the world. Although he would like to see an increase of at least £250,000 in the amount spent on the aeroplane service, the only method of protesting against the insufficient Estimates was the ridiculous one of moving a reduction in them. He, therefore, moved to reduce the Vote by £100.

Mr. Dundas White urged the importance in the present transition stage of endeavouring to make progress by developing the type of aeroplane rather than spending wildly on multiplying the number of machines. He thought before long, instead of the air service being entrusted to the Army and the Navy, a distinct branch dealing with aviation would be required, and that the work of the department might ultimately be the most important part of the Services.

Mr. Lee said the statement which the Secretary for War had made that afternoon had been vastly more satisfactory than his statements to the House last year. At the same time, he did not wish the right hon. gentleman to infer that the Opposition regarded the present position as entirely satisfactory. He joined in the well-deserved tribute which the right hon. gentleman had paid to the officers engaged in this particular service. The right hon. gentleman had not given a satisfactory reason for the departure in his policy. He hoped the Army would not finally and definitely abandon the use of small airships for purely military purposes until the matter had received a great deal more consideration, and until the opinions of those who had to take part in small frontier wars had been obtained. Would the Secretary for War tell the Committee what would be the actual status of the officers of the Army Flying Corps who would be transferred to the Navy? Would they continue to

be Army officers or would they be naval officers, and what would be their prospects with regard to promotion and pensions?

In his remarks concerning aeroplanes the right hon. gentleman had shown them that the position had been greatly improved by his policy of accelerating the completion of the eight squadrons for the Expeditionary Force, and it was a relief to know that within a measurable time the squadrons would be complete. He wished to know, however, whether they would be really on a war footing? But even if the Secretary for War had these eight squadrons on a war footing, what provision had been made for the equipment of the Home Defence Army with aircraft in case the Expeditionary Force were sent abroad? If the Home Defence Army were not provided with aircraft then no matter how well it was led and how strong the position they might hold against the invading enemy it would be doomed. It was more necessary that the Home Defence Army should be properly equipped in this respect than the Regular Army. Had the right hon. gentleman directed attention to this point?

Col. Seely: I have done so.

Mr. Lee, while not denying that statement, said that the right hon. gentleman had not vouchsafed any conclusion at which he might have arrived to the Committee, which was entitled to information on that point. Again, did the present Vote make any special provision for a larger and more adequate staff of mechanics? Without competent mechanics the best flying men in the world were exposed to unnecessary risks. He wished to express the strongest objection to this country raising a voluntary national flying fund or a fund for presenting Dreadnoughts to the British Fleet, or anything of that description. It was the business of the Government and the taxpayer to provide what was necessary, and it ought not to be left to private enterprise.

In conclusion he desired to join in the appeals which had been made to Colonel Seely and Mr. Churchill by the Press on their own side that having demonstrated, what it was unnecessary to demonstrate, that they were men of courage, they should not make it a constant practice to expose their valuable lives unnecessarily to the risks of what was no doubt an exceedingly delightful occupation. If it was a case of restoring confidence in the service owing to a serious accident he would applaud the action of the right hon. gentlemen, but, as Colonel Seely had shown, recruits were pouring in in as large numbers as could be desired for the Air Service, and he thought that the business of flying might now be very well left to those whose proper business it was to engage in it.

Major A. C. Morrison-Bell asked whether any, and if so, what progress had been made in the arming of aeroplanes.

Sir F. Banbury inquired how much of the original vote £2,027,000 was for aeroplanes. If the amount was not large, in view of the present Supplementary Estimate, it would indicate bad budgeting.

Mr. H. Baker (Financial Secretary to the War Office) said it was impossible to give the figure asked for by Sir F. Banbury. With regard to the 52 surplus aeroplanes which had disappeared since July there had been not only a question of their efficiency but one of their safety, which, in view of the present standard, was sufficient to condemn them. The best possible use had been made of these machines. Owing to the element of danger connected with them it would have been wrong to sell them in the open market. They had therefore been dismantled, and such parts as were serviceable had been set aside as reserve and spare parts. Mr. Lee had characterised the transfer of the Army airships to the Navy as a startling change of policy. Obviously it must be an essential part of such an arrangement that so long as the Army required airships, and at present it was believed it did require them, they must be provided by the Navy. The development of the aeroplane service would be all the more rapid if it was conducted under a single control. With regard to the position of the transferred officers which had been referred to by Mr. Lee, that question had not yet been finally settled, but he could give an assurance that the position of these officers would not be worse, but would probably be better, than heretofore. They had a perfectly free choice whether they would be transferred or not. As to British engines for Army aeroplanes, the number of British engines offered to the War Office was so small as to be almost negligible, but it was hoped that that would be remedied by the competition that was to take place in two months' time. Of the 100 new machines that had been added since last July 11 were made abroad and 89 at home, and of these 89 only 18 were made in the Army factory, 71 being ordered from private firms. It had been the unfortunate experience of the War Office that aeroplanes were not delivered as quickly as they would wish, this being partly due to firms over-estimating their power to deliver machines in time. There was no sort of intention on the part of the War Office to entirely cut off orders and manufacture themselves on a large scale.

Mr. Joynson-Hicks, by leave of the House, withdrew his motion for a reduction of the Vote.

Col. Seely said he would make a fuller statement with regard to the position of transferred officers when the Army Estimates for the coming year were presented.

The Vote was then agreed to.

EDDIES.

CHATTING with Jack Alcock at Brooklands I heard glowing accounts of the doings of the 100 h.p. Sunbeam engine on his Maurice Farman biplane. Day in and day out it is his business to take the machine out, flying where and for as long as he likes, simply to thoroughly test the engine, so that it may show what it is capable of doing. Bench tests are all very well in their way, but after all, an aviation engine has to work in the air and not on a bench, and it seems that the Sunbeam method of testing is the right one—get the machine into the air every day, and stay there for hours on end. Alcock is himself delighted with the engine, and tells me that it gives out every bit of the power stated and more, while he has never had trouble with it in any way. On Monday he had a jaunt, with a passenger, to Windsor and back at an altitude of 4,300 ft., returning above the clouds. As a matter of fact, the regular musical sound of his engine could be heard for several minutes before the machine came in sight, descending in a steep *vol plané* out of a bank of thick black cloud. The War Office have, I believe, purchased an engine of the same power, and are now trying it.

Alcock himself has quickly developed into a remarkably skilled and steady flyer, and is probably at the moment doing more actual flying than most pilots. Hardly a day passes but he is in the air most of the time; flying round the aerodrome or making trips over the surrounding country. He is just contemplating a round trip from and back to Brooklands *via* Eastchurch, Shoreham, and Eastbourne, driving his engine all out throughout the trip. It seems but yesterday that he took his ticket on Mr. Maurice Ducrocq's Farman school 'bus, but he now handles his machine with great skill and I look on him as one of the steadiest of our younger pilots.

Speaking of Brooklands, I am glad to see that the Avro firm have again got a shed there. There seemed to be something missing with such old friends away. A very fine 50 h.p. school 'bus was flown to Eastchurch by Raynham on Monday, and I could not help but notice how well he got her off with a strong following wind, and how quickly she climbed to the required altitude for safety in cross-country flying—one circuit of the aerodrome and she was away. By the bye, I have never noticed the air so clear as it was then. For fully ten minutes we could see the Avro getting on her journey eastwards; until when only a speck, scarce a millimetre in size, it could still be discerned, although by that time, with a following wind, she must have been many miles away.

There seems to be no end to the question of Vedrines' duel, which gets more complicated every day. Roux demanded satisfaction, but Vedrines refused to regard the incident as an *affaire d'honneur*. M. Quinton, President of the Ligue Nationale Aérienne, telegraphed to him "to fight or return." His reply was that he would return but only to fight M. Quinton himself. He sent his seconds, but after talking the matter over with M. Quinton they decided that there was nothing to fight for and that the matter was closed. Roux on hearing of the challenge to M. Quinton issued a statement in which he said that if any member of the Aero Club accepted

Vedrines' challenge before he had crossed swords with him, he should consider it a personal affront. Vedrines has now asked two of the greatest duelling experts to form a jury of honour to try the case and taking into consideration the multitude of vexed questions to decide, these gentlemen should have enough to arbitrate upon to last them for some time. It is as well duelling in England is no more; it seems to be no end of a bother and takes up quite a lot of time; and after all I prefer the British method.

A letter received from Mr. Compton Paterson informs us that he is again coming to England, and may be expected to arrive in a week or two. It will be good to see him once again, and no doubt he will have plenty to tell us of the prospects of aviation in the South African corner of the Empire. Our only regret is that poor Cheeseman is not returning with him; he had many friends in the old country, and his death came as a shock to us all.

In these days of competition, much has to be done for the convenience of the paying public, as witness the enormous amount of money that has been expended at Hendon during the last twelve months. I feel sure that people look upon the distance from the paddock to the sheds as the great drawback to visiting Brooklands to view the flying. It is an awful drag right round the left side of the track, and if something could be done to eliminate this walk, I think it would go far to help things along. When people are offered a free ride in preference to walking, they are not, as a rule, over particular what they ride in so that they get there. The track people have a large motor wagon, which could be very cheaply fitted with seats, and if this ran backwards and forwards to the sheds from the paddock it would be much appreciated, and the journey would take but a very few minutes. Personally I should hail it with delight and climb in every time.

An interesting experiment has lately been made in France by M. Guerre with a new device invented by him for the destruction of aircraft. It consists of an arrow fitted with a reservoir containing petrol, which is ignited when the arrow comes into contact with any obstruction. Experiments were made from the first platform of the Eiffel tower. A quantity of straw and wood were placed on the ground and two arrows dropped on to it, fire in each case being started. It is to be hoped the idea will not spread to Kingsway and fire the imagination of some of the ladies in that neighbourhood.



What a fine place the Blériot firm are making of the new works at Brooklands! By taking out the divisions between four or five sheds, they have secured quite a roomy workshop. The glazing of the frontage and end also tends to give quite a workmanlike look to the place. I was peeping in there on Monday, and saw a good deal of machinery being got into position, and everything looked very busy. It should make a difference to this splendid aerodrome, the only drawback to which is that it is rather a long way from town, to add another large school to those already in being. Brooklands has the

unhappy knack of impressing one with the idea that there is nothing doing, whereas, as a matter of fact there is much real work always in progress. A new Vickers monoplane has arrived, but up to now I have not seen it in the air; it looks, however, a real business-like proposition. Everyone was on the *qui vive* on Monday, watching for the arrival of Sippe on a new tractor biplane from Bristol, but they were disappointed; probably, as it was raining hard, the journey had been postponed. The Isaacson-engined Flanders biplane has been doing some fine high flying recently.

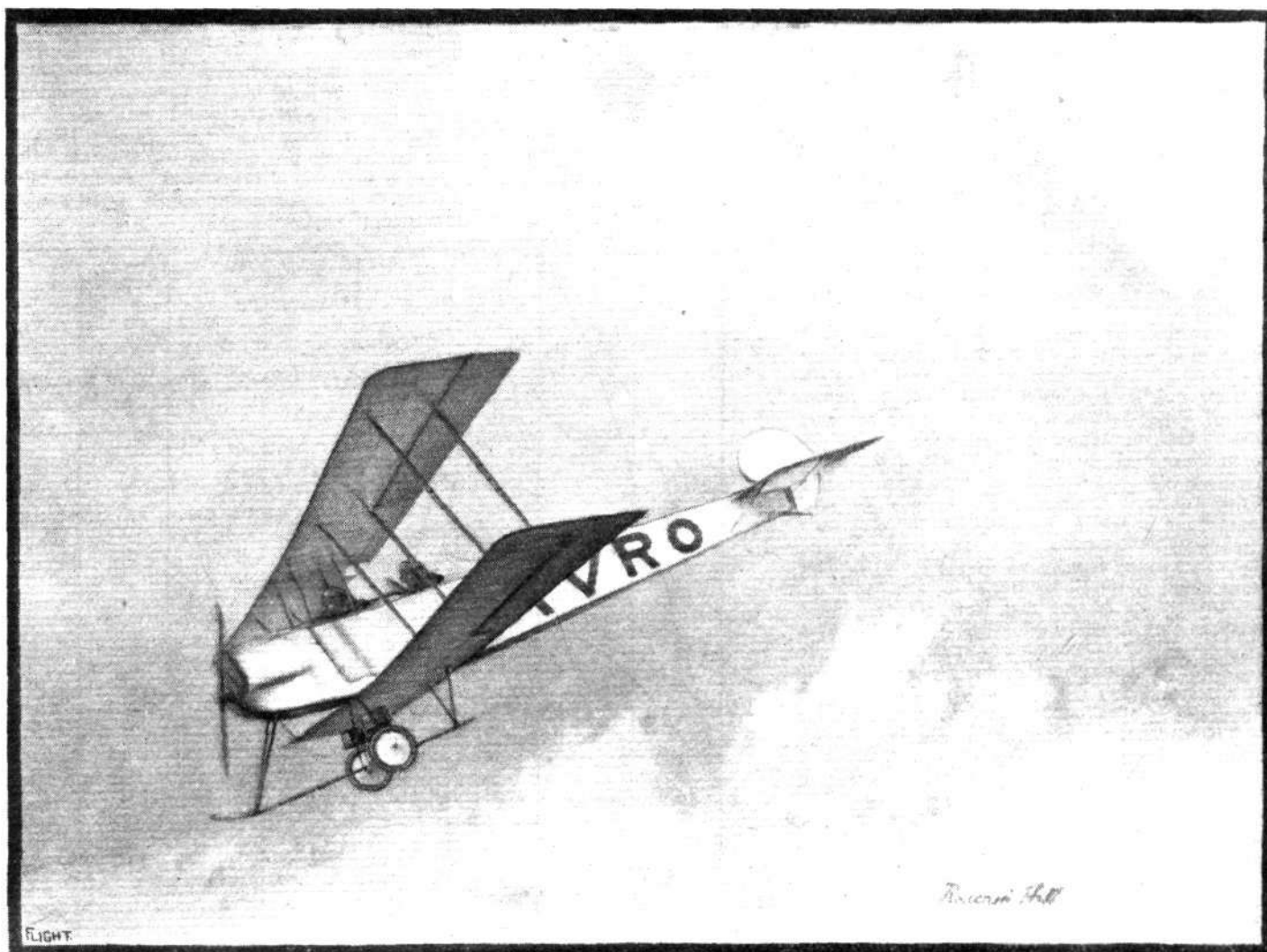
"WILL O' THE WISP."



FLYING AT HENDON.

THE Suburban meeting at Hendon last Saturday opened with a sudden fall of the wind and an equally sudden fall of fine rain, which continued on and off during the afternoon. The cross-country handicap of 16 miles down on the programme, had, of course, to be abandoned, and exhibition flights took its place. The first out was R. H. Carr, who ascended, accompanied by a passenger, on the 50 h.p. G.-W. 'bus (twin rudder), and indulged in some fancy flying, at times disappearing from view in the haze that enveloped the aerodrome. Shortly after, J. M. Cripps came out on the 50 h.p. G.-W. 'bus No. 109, and put up several circuits of the aerodrome. In the meanwhile Carr had descended and had handed over the 'bus to W. Birchenough, who, together with a passenger, also made several circuits. Louis Noel then came out on the 80 h.p. Blériot monoplane, and made a very fine flight, with a passenger, in the rain. Noel has certainly shown himself to be as skilful a pilot of the monoplane as he is of the biplane. After this Carr went up again on the 'bus with another passenger, and performed some very erratic

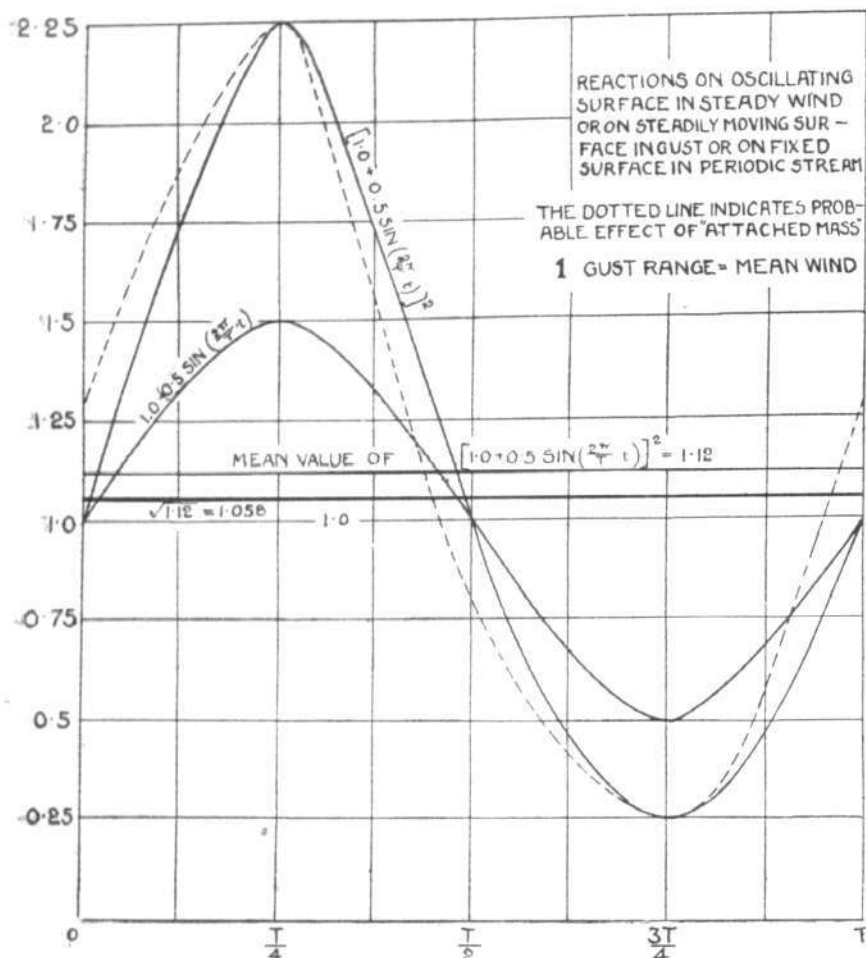
manœuvres, wriggling the machine about in all directions. It looked, in fact, as if he were doing his best to shake the biplane to pieces. No more flying was done until just before five o'clock, when Carr again went up on the 'bus, this time by himself, and made some final wriggles before closing the proceedings for the day. Sunday afternoon was much finer, although, perhaps, a little more windy, and several exhibition and passenger flights were made by the Hendon pilots. B. C. Hucks paid a visit to the aerodrome, and made a flight on the 80 h.p. Blériot with a passenger. Louis Noel also made several flights on the same machine, taking up passengers each time. Other flights were made by R. H. Carr and W. Birchenough on 50 h.p. G.-W. 'buses, Philippe Marty on the 80 h.p. Morane-Saulnier, and Pierre Verrier on a Maurice Farman, whilst F. W. Goodden put up some fine flying on the 45 h.p. Caudron. At one time the five machines were up in the air together. The Hendon Meeting, which opens this (Saturday) afternoon at 3 p.m., will include a Grand Speed Handicap of two heats and a final.



An impression of Raynham gliding on the 80 h.p. Avro. From an original drawing by Mr. Roderic Hill.

THE AERODYNAMIC EFFECTS OF GUSTS ON WINGS, AND OF OSCILLATING WINGS.

By Professor HERBERT CHATLEY, B.Sc. (Engrg.), M.I.C.E.I., A.F.Ae.S.



It is the object of this paper to call attention to a factor in dynamic flight which has received very little attention, and yet may prove to be of the greatest importance.

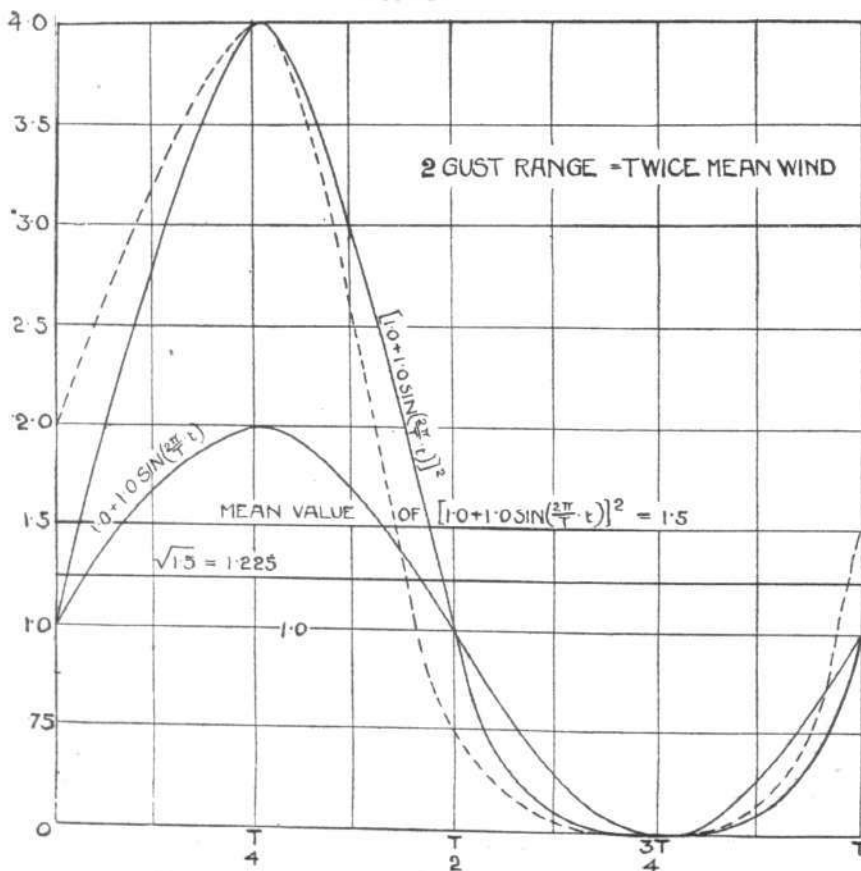
Observations of wind pressure on exposed structures (e.g., The Forth Bridge) indicate that on small surfaces higher pressures are experienced than on large ones, but that, on the other hand, in a steady current, large surfaces tend to have a higher unit pressure than small ones. The latter fact is certainly due to dimensional causes. The effects of dimension have received considerable attention at the hands of the Advisory Committee for Aeronautics, and the manner in which the coefficient of resistance increases with dimension, and the relation of the dimensions to the velocity will be found in the Blue Books issued by the Committee. It remains, therefore, to account for the first fact. There can, of course, be no doubt that it arises from the unsteadiness of the wind, and the complexity of its structure. It would seem probable that the dimensions of the aerial vortices and waves which are termed "gusts" are comparatively small (elsewhere I have pointed out the serious effect this has on the mathematical computation of aeroplane stability) in one direction if not in both. In this connection I would remark on the vertical vortices known as "sand-pillars" (or, at sea, "waterspouts"). These, on a small scale, are very frequently seen in North China. The visible portion, i.e., that within which the velocity is sufficient to keep the dust in motion, varies in diameter from two or three inches upwards. I have not seen them more than a foot or two in diameter. The height is twenty or thirty times the diameter, the structure becoming indefinite at the top. In a perfect fluid a vortex must terminate on a surface of separation if at all; this is true of the lower end of

the sand pillar, but the upper end seems to spread out in spirals, in a manner similar to that which Lanchester conceives to occur at the trailing tips of pterygoid aerofoils. These pillars are generated in the "dead-water" on the leeward side of an obstacle with a vertical edge, and finally pass out into the stream and travel with it. I have seen them travel a mile or more at a comparatively low speed. Doubtless similar horizontal vortices frequently tend to be formed, but lack stability, on account of the absence of a vertical surface of separation. Have they ever been seen to travel up or down the face of a cliff?

Without reference to the question of flight, it would be of great utility to know what effect gustiness of a prescribed amount has on wind pressure, but beyond this the abnormally high pressures which occur, due to gustiness, suggest that a means is provided in this direction for obtaining higher loading on a dynamic flying machine at a given speed than is possible with the present purely gliding forms. Some temerity is needed to refer to the ornithopter after its continuous failure, but the aerodynamic success of the Nicholson and Pichou wheels is, perhaps, some indication that progress may occur in that direction.

The main thesis of this present paper is that:— (1) an oscillating wing may sustain a heavier loading than a gliding wing, the mean velocity being the same, and (2) if the virtual mass of air dragged with the wing during the downstroke can be feathered off at the bottom of the stroke, the upstroke being made "in the wind," there will be a further and possibly very appreciable increase in the loading possible.

Professor Maurice Fitzgerald was the first to call attention to the latter fact, in a paper communicated to the Royal Society by Lord Rayleigh in 1909 ("Proc. Roy. Soc.," A, Vol. 83, 1909.) He shows that the loading per h.p. due to this cause alone, varies as the ratio of the virtual mass to the actual mass of the machine multiplied by the frequency of "flapping."

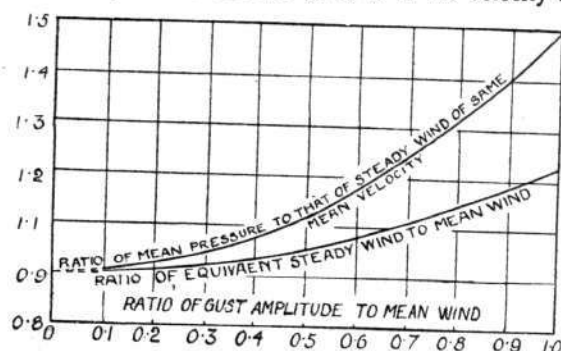


This effect is doubtless small when the angle of attack of the wing is small, but is probably of great value at high speeds and may perhaps largely account for the flying powers of many insects.

It is, however, the first point which I wish to call more special attention to, viz.:—

The mean pressure on a surface due to a stream whose relative velocity varies periodically is higher than that due to a steady stream whose velocity is equal to the mean velocity of the unsteady one.

A complete and formal proof of this statement is not possible, but if it be assumed that during a periodic change of velocity the conditions at any instant are the same as if the velocity at that



instant were steady, then the mere fact that the square root of the mean of a number of squares exceeds the mean of the roots of those squares shows that the effect of variation in velocity is to increase the effective value of the mean velocity, the pressure at any instant being proportionate to the square of the velocity at that instant.

To illustrate this point with a simple numerical example, let it be supposed at a series of moments the velocity, in any convenient units, is 4, 5, 6, 7, 5, 3.

Then the mean velocity is the sum of these (30) divided by 6 = 5. Since, however, pressures (subject to the above mentioned assumption) vary as the square of the velocity at any instant, the mean pressure will be proportionate to the mean square = $(16 + 25 + 36 + 49 + 25 + 9)/6 = 26.66$, and the equivalent velocity, i.e., that which, if steady, would give the same pressure, is $\sqrt{26.66} = 5.16$.

In this case the equivalent velocity is 3.33 per cent. higher than the mean velocity, and the pressure is 6.66 per cent. higher than that of a steady wind of the same mean velocity.

This use of the "Root-mean-square" is similar to that which occurs in alternating current calculations, but it must be remembered that in the latter there is, as it were, nothing but gustiness, so that the formulæ in common use will not apply to this case.

It may be shown when the gustiness is "harmonic" in its variations that, subject to the above mentioned assumption, the mean pressure varies as the sum of the square of the mean velocity and half the square of the maximum excess or deficiency of a gust from that velocity, so that the equivalent steady velocity is

$$\bar{V} = \sqrt{V_0^2 + \frac{1}{2} \Delta V^2}$$

where V_0 = mean wind velocity,

and ΔV = maximum excess or deficiency of gust above or below mean wind velocity,

if we write $\Delta V = k \cdot V_0$, then $\bar{V} = V_0 \sqrt{1 + \frac{1}{2} k^2}$

(k = ratio of excess or deficiency of gust above or below mean velocity to that mean velocity).

The following table and the three diagrams will perhaps be useful to illustrate the ideas involved:—

Coefficient of gustiness ("k").	Ratio of mean pressure to pressure of steady wind of same mean velocity.	Ratio of equivalent mean velocity to actual mean velocity.
0.0	1.0	1.0
0.1	1.005	1.0024
0.2	1.02	1.0099
0.3	1.045	1.0222
0.4	1.08	1.039
0.5	1.12	1.058 (See Fig. 1).
0.6	1.18	1.086
0.7	1.245	1.116
0.8	1.32	1.149
0.9	1.405	1.185
1.0	1.5	1.224

Students of hydrodynamics will, of course, notice a certain weakness in the fundamental assumption. It has been assumed that in an unsteady stream at any instant the conditions are the same as in a steady stream in which the relative velocity of the wind surface to the general body of the stream is the same as that which occurs in the unsteady one at that instant. I believe the analysis of the stream-lines in this unsteady stream transcends the present powers of mathematicians, so that investigation along that line would seem to neither confirm nor deny the result given. Analogy suggests, however, that the reactions cannot well be less than the values suggested, and that almost certainly when the accelerations have been taken into account the reactions will be appreciably more.

This, then, leads us back to the question of the acceleration of the virtual mass. In my little book on the "Force of the Wind" (p. 24) I briefly referred to this problem, but did not clearly distinguish between the velocity effect and the acceleration.

During the increase of velocity there is an excess of pressure equal to the product of the virtual mass and the acceleration, and again during the decrease of the velocity there is a decrease of pressure.

The laws of harmonic motion show that the acceleration varies harmonically if the velocity does so and also varies as the product of the frequency and the amplitude. If the variation of velocity is harmonic (as in the case of a beating wing) then all that requires to be known is the mass of air affected. Doubtless experiment would provide some information as to this, and I suggest that laboratories possessing wind tunnels would do well to experiment with a pulsating stream. The discharge from a reciprocating air-pump might serve the purpose.

The results would probably be applicable to structural design as well as to aeronautics.

Oversea Voyage by the "Sachsen."

THE Zeppelin airship "Sachsen," which is at the disposal temporarily of the German Naval authorities, made a trip from Hamburg to Heligoland and back in the small hours of Tuesday morning. She was seen passing Cuxhaven at 3.30 a.m., and an hour later exchanged flashlight signals with the airship station on the island. She arrived back at Hamburg at 8.30 a.m.

The Slack Fund.

THE following further contributions have been received:—Messrs. A. M. Forman, £5 5s.; S. Pickles, £2 2s.; Glasgow I.C.S. Staff per W. Keer, £1 10s.; M. Desoutter, C. J. Sabiston, J. W. Dunne, £1 1s. each; Victor Lapeyre, F. Bjorklund, £1 each; E. E. Clarke, A. D. Frampton, R. W. Fryer, F. W. Moore, R. D. Scoular, 10s. 6d. each; R. P. Baker, W. W. Odell, E. B. Seymour Norton, Anonymous, H. S. Brough, Mrs. Parke, J. S. Batty, H. F. Jackson, 5s. each; Miss K. Henn, 4s.; Messrs. D. Y. Ferguson, A. Bourne, J. T. Holding, 2s. 6d. each; Anonymous, 1s.

To Help the Benevolent Fund.

A PRACTICAL move to assist the Benevolent Fund for aviators which has been started by the Royal Aero Club has been made by Mr. B. C. Hucks, who has decided to charge a fee of 6d. for each autograph which he gives, the money to go to the fund. Mr. J. C. Savage, manager for Mr. Hucks, estimates that during the last three years Mr. Hucks has signed his autograph over 9,000 times.

AIRSHIP NEWS.

The Britannia Airship Fund.

AT a meeting of the Britannia Airship Fund Committee, Capt. Hawtrey Cox, who presided, said that a donation of £750 had been promised by the Marconi Wireless Telegraph Co., making a total amount of £1,900 received or promised in addition to the donation of Mr. Ralli announced at the inaugural meeting.

The "Montgolfier" at Maubeuge.

THE new French military dirigible of the Clement-Bayard type, the "Montgolfier," on the 20th inst., went from Lamotte Breuil to her new station at Maubeuge. There were eight persons on board, and the journey was made in an hour and three-quarters, the average speed working out to 75 kiloms. an hour.

The "Adjutant Vincenot" at Lamotte Breuil.

By way of returning the call made at Issy by the new Clement-Bayard airship "Montgolfier," the "Adjutant Vincenot," which, it will be recalled, is of similar design, on the 17th paid a visit to the Clement-Bayard works at Lamotte Breuil, carrying eleven officers on board during the voyage to and from Issy.

Aerial Manœuvres at Cologne.

DURING last week some aerial manœuvres were carried out at Cologne, and a typical day's work was that on the 19th inst., when the Zeppelin "Z 2" went to Dusseldorf, Duisburg and Essen, and back to Cologne, while Lieut. Appell made a 4-hr. flight to Marburg-sur-Lahn, and Lieuts. Foly and Hantelmann, each with passengers, 3-hr. trips to Frankfurt.

BRITISH NOTES OF THE WEEK.

THE ROYAL FLYING CORPS.

THE following appointment was announced by the Admiralty on the 18th inst. :—

Lieut. E. Mason, R.N.R., appointed Lieut. on Supplementary List, and reappointed to the "Pembroke," additional for the Isle of Grain Air Station as Flying Officer. To date February 1st.

The following promotion was announced by the Admiralty on the 24th inst. :—

Sub-Lieut. James Lindsay Travers, R.N.R., to be Lieutenant. Dated February 19th.

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending February 20th :—

Flying Depot. S. Farnborough.—Repair, experimental work, and assistance to the Inspection Branch were continued as usual.

No. 2 Squadron. Montrose.—The week was mainly devoted to reconnaissance of the country round about Montrose, and also of warships and submarines near the coast.

No. 3 Squadron. Netheravon.—The pilots were employed on experimental and instructional work throughout the week.

No. 4 Squadron. Netheravon.—The officer pilots of all three flights were busy flying daily. Three machines were flown from Farnborough for the use of the squadron.

No. 5 Squadron. S. Farnborough.—The officer and non-commissioned officer pilots had a considerable amount of practice on Sopwith and Avro machines.

No. 6 Squadron. S. Farnborough.—The B.E.s and M. Farmans with which this squadron is being equipped were flown frequently during the week. Several cross-country reconnaissances were made. The organisation of the squadron is being continued.

Five R.F.C. Squadrons to Camp.

DURING June the five aeroplane squadrons in the South of England will take part in a camp for combined training which will be held at Netheravon on Salisbury Plain.

The Cody Biplane for South Kensington.

THE biplane with which the late Col. Cody won the Military aeroplane trials in 1912 has now been sent by the War Office to the Science Museum, South Kensington, where it is being installed in the ship construction room, close to the "Baby" Wright biplane, lent by Mr. Alec Ogilvie.

Mr. Churchill on a Sopwith.

DURING a visit to Hendon on Friday of last week, Mr. Winston Churchill, First Lord of the Admiralty, went up with Lieut. Spencer Grey, R.N., on a Sopwith biplane. A strong wind was blowing at the time. On the previous day Lieut. Grey had piloted the machine from Brooklands, but owing to the mist and the rain he found considerable difficulty in finding his way. He took 2½ hours for the trip, and had to make four descents.

Mr. Churchill Over Spithead.

SOME more practical experience with seaplanes was included in the visit of the First Lord of the Admiralty to Portsmouth on Monday. He was taken up by Lieut. Longmore on one of the new M. Farman waterplanes, Mr. Churchill going on board the seaplane as it floated alongside the Admiralty yacht. A course was taken over the flotilla of submarines manœuvring in Spithead, after which a long flight was made round Portsmouth and over Whale Island before the seaplane again alighted alongside the Admiralty yacht, "Enchantress." A little later Mr. Churchill made another similar flight.

Wedding Bells.

CONGRATULATIONS to Commander Neville Osborne, R.N., of the Naval Wing of the Royal Flying Corps, who was married on Monday at St. Margaret's Church, Westminster, to Miss Betty Hamilton. Lieut. Malone was best man, and the Naval Wing, R.F.C., provided a guard of honour.

The Royal Aero Club Annual Dinner.

As announced, the annual dinner of the Royal Aero Club, which was to have taken place yesterday (Friday) had to be postponed to Wednesday next, March 4th. Owing to the hall at the Royal Automobile Club not being available for that date, the function will be held at the Savoy Hotel. Mr. Winston Churchill, First Lord of the Admiralty, will be the principal guest.

British Team for the Gordon-Bennett Race.

SIX entries having been received by the Royal Aero Club for this year's Gordon-Bennett race, it will be necessary for the Club to arrange eliminating trials to select the British team of three. In addition to the entries of the Avro, Sopwith and Bristol firms, which have been already noted, Messrs. Vickers, Ltd., have sent in an entry, while Messrs. Cedric Lee have entered two machines.

The Fatal Accident at Wittering.

ONE of the new Army biplanes of the FE2 type was involved in a smash at Wittering, about seven miles from Chichester, on Monday. The machine was being piloted by Mr. Ronald Kemp, and carried Mr. E. T. Haynes as passenger. From the evidence given at the inquest, on Tuesday, it appears that the machine over-banked when making a steep right-handed spiral descent from a height of between 500 and 600 ft., and side-slipped. Mr. Haynes sustained a fractured skull and spine, and died shortly afterwards. Mr. Kemp, whose injuries included a broken leg, displayed remarkable fortitude, and directed the removal of the unfortunate passenger from the debris. A verdict of accidental death was returned at the inquest, and the jury expressed their sympathy with the relatives. At the time of writing, Mr. Kemp is reported to be progressing favourably.

No Naval Manœuvres this Year.

It has been officially announced that there will be no Naval grand manœuvres this year, but a test mobilisation will be carried out in July.

The Sunbeam-M. Farman Visits Shoreham.

A FINE trip from Brooklands to the South Coast was made by J. Alcock with a passenger on the 100 h.p. Sunbeam-engined Maurice Farman on Tuesday, the machine arriving at Shoreham 7,500 ft. up. After taking up several passengers for trips to Brighton, Worthing and well out to sea, the return was made to Brooklands, the altitude, however, not exceeding 4,000 ft., as the clouds were low and it was very misty.

Annual Dinner of the London Aerodrome.

FRIDAY, March 20th, has been selected as the date of the first annual dinner in connection with the London Aerodrome, Hendon. The function will be held at the Royal Automobile Club, Pall Mall, S.W., and the Right Hon. the Earl of Lonsdale will be in the chair, while during the evening the trophies won during the past season will be presented.

Sunbeam Activity.

ON Monday, February 16th, Jack Alcock, on the 100 h.p. Sunbeam-M. Farman, made good cross-country flight to Staines and Windsor with passenger at 2,400 ft., also took up Lieut. Blatherwick and Mr. Coatalen, the designer of the Sunbeam engine. On Wednesday, 18th, one flight of 50 mins. at 4,500 ft., with passenger; also passenger carrying in the afternoon, while the next day a good flight was made with Lieut. Blatherwick in the rain at 2,500 ft. Tests were also made with a Lang propeller. Some passenger flights—one at 2,300 ft. through the clouds—were made on Friday and Saturday last.

The Sopwith in Australia.

ATTRACTED by the announcement that Mr. H. G. Hawker was to fly the Sopwith machine which he had brought from England, a crowd of about 15,000 people visited the Randwick Racecourse, Sydney, on Sunday. Among the passengers who were taken up were the Governor-General, Lord Denman; Miss Strickland, a daughter of the Governor of New South Wales, went up with Mr. Hawker on the previous day.

A 600 h.p. Canton-Unné Motor.

It is interesting to note that the Dudbridge Iron Works, Ltd., who are now building the Canton-Unné engines over here, are engaged in the construction of a 600 h.p. engine. Incidentally it may be pointed out that, owing to a printer's error in the table of engines appearing in our last issue, the 90 h.p. Salmson (Canton-Unné) engine was credited with 17 cylinders instead of 7. The motor is similar to the 14-cyl. engine, except that it only has one ring of cylinders.

Good Business by the G.A.C.

It is gratifying to learn that the General Aviation Contractors, Ltd., have just been favoured with contracts from the Grecian Government for a considerable quantity of their "Gnomol" castor oil, and a number of Roold and G.A.C. clothing equipments and accessories. During the past four weeks orders have been received from China, Australia, Canada, South Africa and the United States, thus showing the extensive reputation of the firm—like unto an octopus!—and, incidentally, the wide-spread channels into which FLIGHT circulates.

Good Work by the Isaacson Engine.

It will be seen from the report of the doings at Brooklands on p. 215, that some very fine flying has been done recently by Mr. Dukinfield Jones, both with and without passengers, on the Flanders biplane, which, it may be recalled, is fitted with one of the new Isaacson engines.

FOREIGN AIRCRAFT NEWS.

Another German Height Record.

ON a Rumpler monoplane at Johannisthal on the 18th inst., Lennekogel beat the German record for pilot and one passenger by going up to 4,300 metres. The world's record for pilot and one passenger stands at 4,960 metres.

The Garros-Hamel Match.

IN spite of the wet and windy weather, a large crowd was attracted to the Juvisy aerodrome on Sunday to see the match between Hamel and Garros. Garros was fortunate, and secured the right to start first, one minute in advance of Hamel. Ten laps of the two kilom. course had to be covered, and Garros won the first heat in 12 mins. 6 secs., Hamel in the ninth lap, finding he could not win, rising and making a very fine loop. The two pilots then exchanged machines, but again Garros was the victor. This time he completed the 20 kiloms. in 11 mins 4½ secs., while Hamel's time was 11 mins. 11½ secs. Garros, having won two events, no further contest was necessary, and the two pilots then went on to give a very fine display of fancy flying, including looping the loop, &c. Both pilots used Morane-Saulnier machines of identical design, and fitted with Gnome engines and Integral propellers. Subsequently the winner was challenged by Audemars and Friedrich, and the challenges were accepted.

French Military Aeronautics.

IT was announced by the French military authorities last week that following on the formation of the new and separate department for Aeronautics with its own special Council, it has been decided to create two new posts: an Inspector of Aviation and an Inspector of Aerostation. The former will give his attention to aeroplanes while the latter will deal with dirigibles and balloons which have been somewhat neglected during the past year or so.

Fast Flying on a Ponnier.

ON Tuesday of last week, Emile Vedrines, on a new type of Ponnier monoplane, made a fine trip from Rheims to Paris. Starting from Rheims at a quarter past three, he flew at an altitude of about 2,500 metres until near Paris, when he came down to 200 metres and followed the course of the Seine, landing at Issy after flying for an hour and five minutes.

Two New Loopers.

THE number of pilots who have successfully looped the loop was increased to thirty-seven last week, Bill carrying out the manoeuvre on a Henry Farman on Wednesday, while Legagneux did it on a Blériot on Saturday.

M. Farman Gives His Daughter a Flight.

AT Buc, on the 18th, Maurice Farman gave his daughter her *baptême de l'air*, and took her for a little excursion to Rambouillet. He also made a long cross-country flight with Senouque as passenger.

Testing an Aerial Torpedo.

SOME tests were made on the 18th inst. from the first platform of the Eiffel Tower with an aerial torpedo or bomb invented by M. Guerre. The device consists of a cylinder of petrol mounted on a steel arrow, the point of which is so arranged that, as soon as it comes in contact with anything, it liberates and ignites the spirit. To guide the bomb during its flight the rear end is provided with helicoidal fins. The bombs were dropped on to bales of straw, which were ignited and entirely destroyed in three minutes. At

the request of the French military authorities, experiments are to be made in dropping the projectiles from an aeroplane in flight.

A Disaster at Lyon.

EXTRAORDINARY damage was done by a gale which swept across the district of Lyon on Sunday morning, and the military aerodrome, Bron, just by the town, suffered heavily. Ten hangars were blown down, and among the machines which were damaged more or less severely were thirteen Farman machines, most of them practically new machines.



Herr Bruno Langer and his Roland-Pfeil biplane on which his big record was accomplished recently.

Further Tests with the Bonnet Parachute.

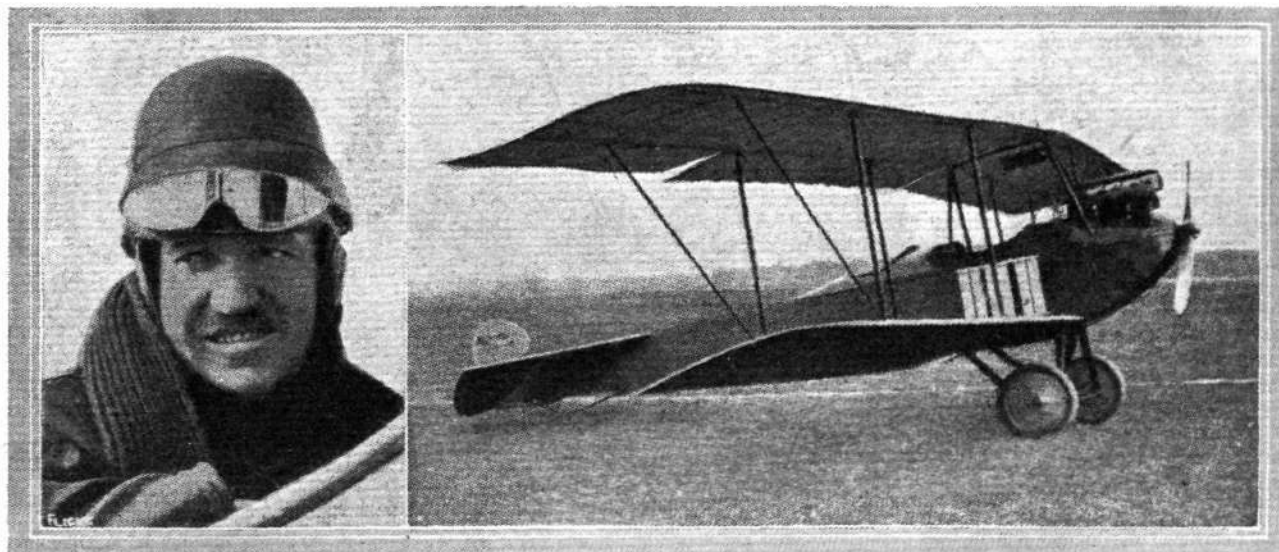
ON Saturday last another extraordinary demonstration was given at Juvisy with the Bonnet parachute. The aviator Lemoine took up on his Deperdussin machine another pilot named Le Bournis, and when at a height of about 400 metres, the latter threw himself from the machine during a *vol piqué*. Opening quickly, the Bonnet parachute was carried by the strong wind for a distance of about two kilometres before depositing its burden in the river Seine. Le Bournis was rescued none the worse for his immersion.

Long Flight in Germany.

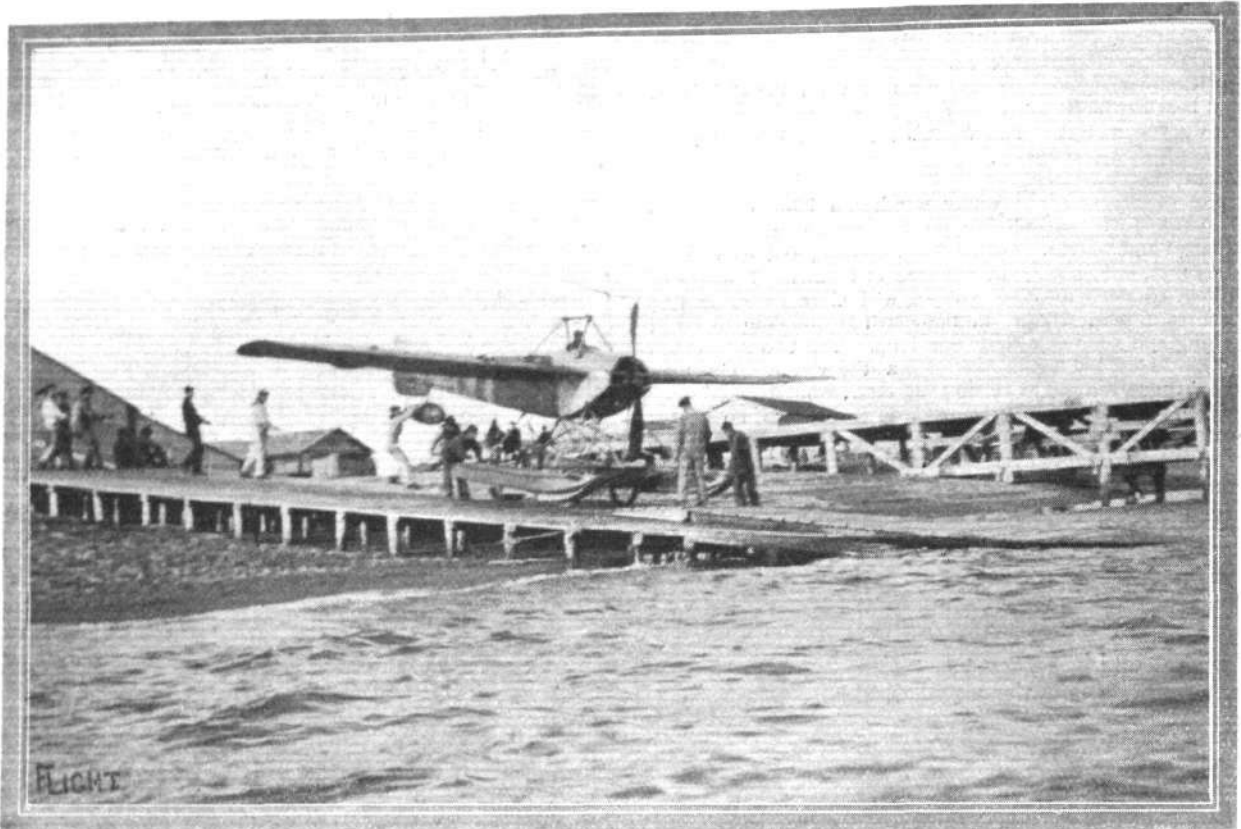
LEAVING Johannisthal at 7.30 a.m. on a Rumpler-Taube on the 18th inst., Basser eventually landed after flying for 10 hrs. 7 mins. at Wanne. His route was by way of Magdeburg, Cassel, Frankfurt, Bingen, Coblenz, Bonn, Cologne, and Dusseldorf.

German Military Pilots at Johannisthal.

THE special military order prohibiting military pilots from flying at the Johannisthal aerodrome was withdrawn on the 18th inst. New regulations, defining certain areas for starting and other places for landing, are now in force at Johannisthal.



Herr Karl Ingold and his 100 h.p. Mercedes Aviatik-Pfeil biplane on which he made his recent record flight.



Photograph by Capt. J. C. Halahan.

AT THE FREJUS NAVAL AIR STATION.—Launching a Nieuport waterplane. The method adopted is to warp it out to an anchored buoy about 100 yards from the shore; the cradle on which it travels on land is then unlashd and sinks, to be drawn in shore later, the pilot starting the engine himself from the seat.

The South German Circuit.

ARRANGEMENTS are now being completed for the South German Circuit, which will be held from October 10th to 15th. Starting from Nuremburg, the first day's flight will end at Munich, while the second day's stage will be to Stuttgart, where there will be one day's rest. The next stage will be to Thuringen, where an exhibition of the competing machines will be held, after which the return to Nuremburg will be made *via* Hof and Bamberg. The competition will only be open to civilian pilots.

A Pekin to Paris Attempt.

It is reported from St. Petersburg that the Russian Government has decided to assist Janoir, who is now in their service, in an attempt to fly from Pekin to Paris, which he proposes to make during the coming spring.

Medals for Russian Aviators.

THE Aero Club of Russia has decided to give medals to: Lieut. Nesterow for looping the loop; Alekhnovitch for his Russian height record; Mikhailow for his non-stop flight from St. Petersburg to Tver; and to A. Wassiliew for his flight from St. Petersburg to Moscow and back within 50 hours.

The Heliopolis Meeting.

THE four days' meeting which opened at the Heliopolis aerodrome on the 19th inst., mainly consisted of displays of looping the loop by Chevilliard on his Farman, and Guillaux on a Blériot, while Olivier carried passengers on his Farman. On the 20th, Guillaux is said to have looped the loop nine times in succession during one flight.

The Turkish Flight to Alexandria.

LAST week a little further progress was made by the two Turkish officers who are flying, with passengers, from Constantinople to Alexandria. Capt. Fethi had a mishap while flying between Beirut and Damascus which entailed delay until a new propeller could be obtained, while Lieut. Nouri succeeded in crossing the Taurus mountains.

Good Flights in California.

AT Los Angeles, on the 17th inst., Christofferson on a biplane flew, at a height of 6,500 ft., across the mountains, and covered 170 miles in 3 hours 45 minutes. On the 9th inst. Christofferson

flew from San Francisco to Bakersfield, Cal., taking six hours for the 306 miles. He went on to San Diego the next day.



Two Bedouin watchmen, known locally as Gafirs, on guard over Mr. W. Oswald Watts' Blériot at Heliopolis.

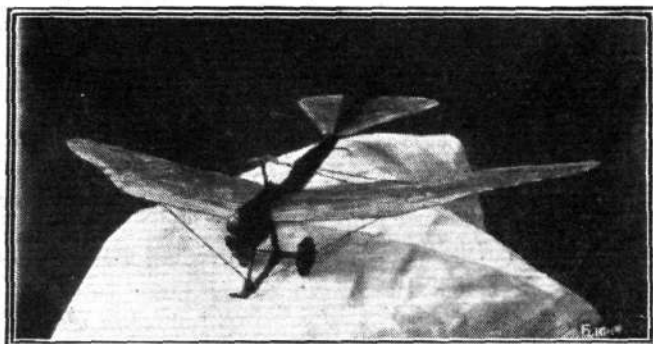


Edited by V. E. JOHNSON, M.A.

An Interesting Type of Paper Glider.

"I HAVE read with great interest the articles appearing in FLIGHT referring to paper gliders," writes Mr. Thomas Key, "and I am sending you a specimen of my type of glider, which is a result of four years' experiments. These machines have a good gliding angle, and are very spectacular in flight. The fitting of a landing chassis is highly instructive, as it shows the great strains imposed on this part of the machine, besides adding to the interest. I have found that after the 'cables' have loosened themselves a little, thus allowing the machine a certain amount of give, the models fly better. They will fly very well in strong winds, and have shown themselves to be very stable, and on several occasions I have induced them to loop the loop, which feat they have performed quite successfully. My friend, Mr. W. Beasley, who has helped me in my experiments for the last two years, has kept one of these machines for six months, using it very often, which I do not think is bad for a paper glider."

The little glider which our correspondent has been good enough to send us, is one of the most interesting of this type of model that we have seen for some time. The addition of a chassis, skid, and little paper disc wheels, that run quite freely in a little paper tube (a piece of drinking straw could have been used) greatly adds to the



A novel paper glider designed by Mr. Thomas Key.

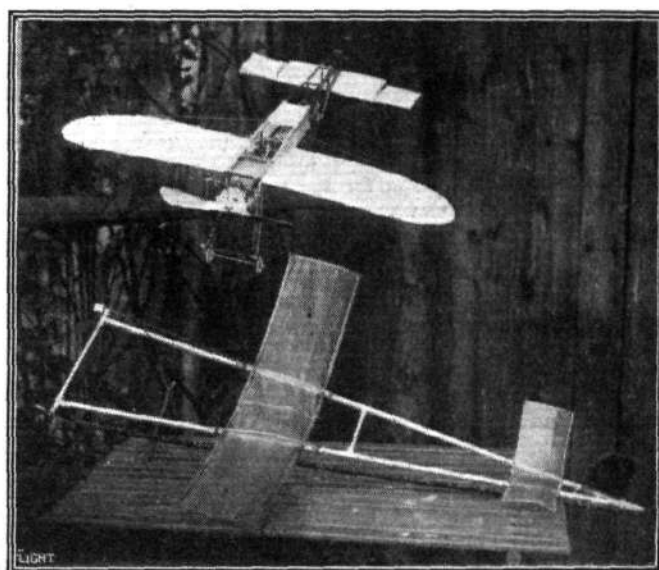
interest of the little machine. Its weight, we find, is exactly 4.5 grammes, it has a span of some 9.5 ins., the wing breadth tapers from about 1.75 ins. to $\frac{1}{8}$ of an in. Overall length 6 ins. Tail triangular; length of base, 1.75 ins.; height or altitude, $1\frac{1}{8}$ ins. Distance of apex of tail from trailing edge of wings, 1.5 ins. Fin (above tail plane), a right-angled triangle; altitude (along tail plane), 1.75 ins.; hypotenuse, 2 ins., base $\frac{1}{8}$ in. All sharp corners rounded off, and both trailing edge of wings and tail next to the fuselage cut away. Planes rather deeply cambered at the centre, washed out towards the tips. Diameter of wheels, $\frac{1}{8}$ in. Distance apart, slightly over 1 in. The wings are braced both on the upper and lower sides with black thread, 4 cables above and 4 below.

The threads are joined to the wings by means of tiny paper discs stuck on. They are placed near the leading edge and about two-thirds from the leading to trailing edge in pairs, both above and below. The centre of gravity is about half way across the wings from front edge to rear. The wheels are slightly in front of this. The model is weighted with three brass paper fasteners, fixed in the nose of the fuselage. There is a small skid under the apex of the tail, pointing to the rear at an angle of some 30°. The entire model is varnished, and this has dried so irregularly as to render the model somewhat difficult to photograph. We can quite understand that such a model should last six months with reasonable care, and we quite agree with all that Mr. Key says, save one remark, viz., that the machine will glide well in strong winds. It will do so in a light breeze, and loop the loop most gracefully, but in a strong gusty wind, such a light model is blown all over the place. It is most interesting to watch, because it shows you quite clearly what could happen in the case of a full-sized machine if the pilot lost control of his machine in a really big gale.

Mr. J. F. S. Corkett's Models.

"Enclosed is a photograph which may be of interest to readers of FLIGHT. It represents two of my aero models—a scale Blériot XI and a hand-launched twin-propeller model.

"The Blériot was built entirely by the aid of drawings and diagrams that have previously appeared in FLIGHT. Its imitation 3-cylinder Anzani engine, bell control, and built-up fuselage and planes are of special constructional interest. The construction of this machine was undertaken in the winter months, when it formed a most interesting hobby. Later it was shown at a local exhibition, where it secured second prize. The flying model is the result of last spring's experiments, and was completed in August, 1913. A few days before Christmas, after it had been in constant use for five months, it was sent to America, where it has been flown regularly ever since. Many people are of the opinion that such models last but a short time; this, however, was not the case with the model just referred to."



Two models by Mr. J. F. S. Corkett.

A Note on Egg-Beater Winders. BY M. J. DUDLEY.

"I have seen in FLIGHT lately two or three drawings of egg-beater winders; when using such, it is a good plan to put a small fretworker's table clamp in your pocket, when you go flying; then instead of someone else holding the machine or the winder, the latter can be clamped to a form, post, fence, &c., and held much firmer in consequence. The ordinary 6d. egg-beater is in general use, but it is very much better to buy the one costing 1s. 3d.; anyone doing so will soon appreciate the difference. Both are made by the same firm. May I ask your readers what is the record for a light and small hydro-aeroplane? I have just completed a Ding-Sayer model 18 ins. frame, weight 2 ozs. exactly, inclusive of everything. It will rise from the surface of the water in 6 yards, and in 18 yards cleared a fence 6 ft. in height, afterwards flying in one large circle. Might I also express my thanks for the help that your model section has been to me in the past?"

Projected Areas and the Loading Question.

There is nothing very terrible or difficult to understand about this matter. Practically speaking, all surfaces save vertical ones are to count. Now obviously where surfaces are not horizontal but inclined at an angle to it, if such were reckoned up with respect to their full area, i.e., the number of square inches or square units contained in the product of their total length and breadth, it would not be fair because such surfaces are not exerting their full lift, in some cases nothing like it. In the case of a monoplane with upturned tips for lateral stability such, save when the model is banked, exert practically no lift at all.

Now what is the "projected area" of such a plane? Place the model in a horizontal position on a table, on, say, a sheet of cardboard or white paper. Next drop (in imagination or in reality), perpendicular lines from the outer edges of the plane all round it, on to the sheet of paper, the area enclosed on the sheet of paper by such perpendiculars is the projected area. Perpendiculars are, of course, vertical or plummet lines.

If the machine be a biplane, then both planes, whether equal or unequal, must be treated in the same way. If the lower plane has the same chord and span as the upper, then, whether straight, curved, or dihedral, its projected area is the same as the upper. Some of the areas may possibly require a little calculation. Rectangles and triangles are easy enough, but when one has to deal with arrow-headed and swept back wings of varying chord, rounded-off tips, &c., &c., then you may begin to grow a little warm. The best way is to consult any decent book on mensuration. But, generally speaking, the matter can be dealt with on the straight line principle, making due allowance for little pieces, balancing "outside pieces against" inside ones.

The question of camber does not, of course, come into the question at all.

Is the Canard Type any Good?

In reply to Mr. H. H. Groves' query, "What was the real cause of failure in full-sized Canard type machines?" Mr. Handley Page replied, if we remember correctly, "Too much surface in front of the centre of pressure." After the lecture the writer had a few minutes' conversation with Mr. Groves, and understood that he had been endeavouring to design a power-driven Canard-type model—fitted with a covered-in fuselage—and that he had given it up as a bad job. We wonder how many others have tried it, with like result. The problem of a covered-in fuselage for a Canard-type machine seems like the exact squaring of the circle, unsolvable. I have a dozen such designs before me as I write, not one is satisfactory. In some cases it is no fault of the designer that such is the case, but of the design. In the first place, apart altogether from the matter as replied to by Mr. Handley Page, the fuselage is the wrong way about for a proper streamline form, or the correct streamline form is the wrong way about for the type of machine, it does not matter in the least which way you regard it.

It is no use trying to shirk the question, as aeromodellists have done with their single stick or triangular frames. You cannot use such constructions as these in full-sized work. Then of what use are they? It is no longer necessary that aeromodellists should build such machines for experimental purposes, to test planes, propellers, &c. Because other types to which fuselages of correct streamline form can be attached can now fly quite long enough for such purposes.

So far as full-sized work is concerned, covered-in fuselages are essential, both for military and naval purposes, and for cross-country passenger traffic. People will not go for journeys of any length where they are exposed to the full force of the elements. In war machines the machine must be protected (armour plated), i.e., its vital parts and the pilot, &c., as well. Another point of what use is a machine for military purposes where you cannot fire a gun without shooting off some part of your machine? Some of the most absurd designs have been put forward in this respect; with an

elevator in front of you and a propeller, &c., behind you, and struts, stays, &c., on either side, where does the firing angle come in? Again, if the Canard-type machine becomes "stalled," what is there to prevent it slipping backwards, and if it does so what is going to save it? There is also the question of landing, and in the case of hydro-aeroplanes of alighting on the surface of the water. The least dig of the front float and the back of your machine is at once broken.

It is claimed that such machines have a greater degree of inherent or automatic stability. Model experiments certainly seem to show that in the form which such models usually take such is the case, but it has not, so far as I know, been shown that such is the case when the design is such as could be applied successfully to future full-sized work. If the full-sized Canard-type machine is any good, why is it not more in evidence, why has it been tried by some of the best designers and given up? Some aeromodellists contend that the designs were not such as would be likely to lead to success, basing their conclusions apparently on model experiments, but the question which arises is, are their models of such a design as to justify such conclusions? We are afraid not. There exists, I believe, in certain quarters, an idea that the writer is prejudiced against the Canard-type machine. Nothing could be more erroneous; if there has been any prejudice it has been the other way about; and it is with a feeling of the greatest reluctance that the writer has come to the above conclusions. But it is impossible to shut one's eyes to the drawbacks of such a type of machine from a full-sized point of view, or, even for that matter, from a model point of view, using the word in its best sense. No one would be more pleased than the writer could the views which he has expressed above be shown to be really erroneous, and the conclusion he has come to, that the Canard-type machine is for practical purposes useless, be shown to be altogether wrong.

I shall be pleased to hear what any of my readers have to say on the above points, either for or against.

To Ascertain the H.P. of a Rubber Motor.

A correspondent writes, asking: How can I find out the h.p. of my rubber motor? but gives no particulars.

Let us suppose the motor, when wound up to 500 turns, to run down in half a minute, i.e., at a mean speed of 1,000 revs. per min. Suppose the mean thrust of the propeller to be 2 ozs., and the pitch 1 ft. Then the number of foot-lbs. of energy developed = $\frac{2 \times 1,000 \times 1 \text{ ft. (pitch)}}{16 \text{ ozs.}} = 125 \text{ ft.-lbs. per min.}$ But the rubber motor runs down in 30 secs. ∴ energy really developed = $\frac{125}{30} = 4.16 \text{ ft.-lbs.}$ The motor, therefore, develops power at the rate of $\frac{4.16}{33,000} = 0.000126 \text{ h.p. for 30 secs. only.}$

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Single screw, hand-launched	Duration	D. Driver...	85 secs.
Twin screw, do. ...	Distance	R. Lucas ...	590 yards.
	Duration	G. Hayden ...	137 secs.
Single screw, rise off ground	Distance	W. E. Evans ...	290 yards.
	Duration	W. E. Evans ...	64 secs.
Twin screw, do. ...	Distance	L. H. Slatter ...	365 yards.
	Duration	J. E. Louch ...	2 mins. 40 secs.
Single-tractor screw, hand-launched	Distance	C. C. Dutton ...	266 yards.
	Duration	J. E. Louch ...	91 secs.
Do., off-ground	Distance	C. C. Dutton ...	190 yards.
	Duration	J. E. Louch ...	94 secs.
Single screw hydro., off-water	Duration	L. H. Slatter ...	35 secs.
Single-tractor, do., do.	Duration	C. C. Dutton ...	29 secs.
Twin screw, do., do.	Duration	L. H. Slatter ...	60 secs.

Aero Show.—All club entries should reach the hon. sec. by first post on Monday, March 2nd. Individual entries must reach the hon. sec. by Wednesday, March 4th, to ensure insertion in the official catalogue, after which date no entries will be accepted.

Affiliation.—It is with pleasure that the Council announces the affiliation of the first foreign club, viz., the Rotterdamse Model Aero Club, with a view to the promotion of an international meeting. It is hoped shortly to be able to announce that further foreign clubs have affiliated, so that if possible a good entry will be assured for the proposed international meeting. The above club, it will be remembered, sent over a representative to compete in the Gamage Cup contest in 1912, and he (Mr. R. C. Noordwyn) was successful in taking back the trophy. He, being in this country, has been elected by his club to represent them on committee.

Trophies.—All holders of challenge trophies are asked to forward same at once to the hon. sec. for the purpose of exhibiting same at the forthcoming show.

Trials in Connection with the Aero Show.—At the last meeting of the Secretaries' Guild it was suggested that the trials should be held either during the Easter Holidays or on April 3rd and 4th, but at present no exact date can be given until the judges have decided, but in any case the best dates will be selected in order to please, if possible, the majority of competitors, and will be decided at the secretaries' meeting on Wednesday, March 18th, which will be held at the Show.

27, Victory Road, Wimbledon.

W. H. AKEHURST, Hon. Sec.

AFFILIATED MODEL CLUBS DIARY AND REPORTS.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Aero-Models Assoc. (N. Branch) (27A, SEDGEMERE AVENUE, EAST FINCHLEY, N.)

FEB. 28TH, flying at Finchley, 3 p.m.; March 1st, 10 a.m.; also indoor meeting at Commercial Rooms, 383, Archway Road, March 5th, 8 p.m., sharp, interesting evening being arranged. Indoor meetings and lectures at new club-room every fortnight, commencing Feb. 18th.

Monthly Report.—Flying during past month rather slow. Members busy on Olympia machines, at which we hope to make a record exhibition. Up to time of report 12 machines will be exhibited. Machines out this month being Mr. Partridge, 1-10-P₁; Mr. N. Colman, 1-10-P₂; Mr. Hindsley, tractor; Mr. Root, 1-10-P₁. Successful indoor meeting held at new clubroom. During evening Mr. Pickley gave an address on "The Relation of the Model to Full Size Machines." Discussion followed. Mr. Griffith, a new honorary member, who is doing good work in rousing the people's interest on aviation in East Finchley, was present.

Leytonstone and District Aero Club (64, LEYSPRING ROAD).

MARCH 1ST, flying, Wanstead Flats, 10 a.m. If wet meet at clubroom.

Monthly Report.—Feb. 1st, four h.l. models were in evidence, one hydro. and one r.o.g. Mr. Bedford obtained best flights of the morning. Feb. 8th and 15th, rain prevented all flying, and the members met at the clubroom. Feb. 22nd, Mr. Bond arrived with a r.o.g. and Mr. Bedford with a hydro, but for the third time this month rain put a stop to flying practically before any started. The committee have arranged that members of this club may enter models at Olympia for a fee of 2s. each model.

N.E. London Model Ae. C. (47, JENNER RD. STOKES NEWINGTON, N.)

Monthly Report.—Flying curtailed by inclement weather. Our competition programme is now under contemplation, and the sec. would be pleased to receive suggestions from members with respect to same.

Paddington and Districts (77, SWINDERY ROAD, WEMBELEY).

SATURDAY, Feb. 28th, Flying at Sudbury.

Monthly Report.—The past month being mostly wet, particularly on Saturdays, very little flying has been done. Jan. 31st was very windy. G. Rasmussen flying tail monoplane, which showed excellent stability. F. Lang tuning up twin propeller monoplane. C. C. Dutton flying 4-ft. hollow spar twin propeller monoplane, and instructing new members. M. Levy, tuning up 4-ft. A frame monoplane, smashed fuselage. W. E. Evans testing 3 ft. 6 in.

tubular fuselage monoplane, which, first time of launching, flew out of ground into a tree. Feb. 14th, rain commenced at 4 o'clock up to which time only a little flying was done. M. Levy with 8 oz. single propeller monoplane did 30 secs. D. Driver was obtaining excellent flights. Other members present were R. Bird, G. and A. Rasmussen, T. Carter, F. W. Johnson, and C. C. Dutton. Feb. 21st was like Feb. 7th, very wet, and no flying was done. Four new members have been elected, one each week, these being Messrs. A. Rasmussen, E. Eades, J. H. Barrett, and H. H. Warwick. Members who intend exhibiting models at Olympia will please note that they must fill in their red forms at once, if not already done, and hand same to the hon. sec., W. E. Evans, to-day, Feb. 28th, after which date no entries can be received.

Reigate, Redhill and District (THE COTTAGE, WOODLANDS AVENUE, REDHILL).

FEB. 28TH, flying, Earlswood Common.
Monthly Report.—Very little flying has been done owing to members being busy on Olympia machines. Messrs. Wilson have had out a floating tail mono. r.o.g., getting up to 54 secs. and 415 yds., also 8-oz. r.o.g. Canard, getting 36 secs. Mr. Young has had out a 7-oz. r.o.g. Canard mono., which he afterwards converted into a floating tail, getting better results with same power.

Sheffield Ae.C. (41, CONISTON ROAD, ABBEYDALE, SHEFFIELD).

Monthly Report.—Feb. 7th, general meeting at Mr. O. H. Broomhead's. It was decided that a general meeting be held on the first Saturday afternoon, 3 p.m., in every month at the above address. Mr. W. H. Bagshaw was elected vice-president, Mr. C. F. W. Cudworth secretary and treasurer combined, and Mr. E. W. Colver president. In view of encouraging more enthusiasm in aviation in Sheffield the entrance fee and subscriptions were lowered. The club has a very big programme to get through during the year, for the following prizes and competitions are to take place:—The Colver Cup, for r.o.g. machines; the President's Challenge Cup for hydro-aeroplanes; Mr. M. D. Manton's medal for tractor biplanes. Also two medals offered by Mr. Cudworth as follows:—Silver aviation medal to be awarded to the member making the longest duration record from March 28th to Dec. 25th, with r.o.g. machines, to be capable of carrying 4 ozs. dead weight, machine to weigh 4 ozs. and 2 ozs. of rubber; bronze aviation medal, for novices only, to be awarded to the member making the longest duration flight with h.l. machine, any weight or size, from March 28th to Dec. 25th. All the above competitions are for club members only. Further particulars can be obtained from the secretary. All interested are invited to attend the general meeting on March 7th, 3 p.m., at Mr. Broomhead's, Leopold Street.

Stony Stratford and District Kite and Model Ae.C. (OLD STRATFORD).

Stony Stratford: March 4th, meeting Wolverton. Subject, Mr. Handley Page's lecture to the K. and M.A.A. Building evening, March 18th, at clubroom. March 21st, members' visit to Olympia; 28th, competition at Stony Stratford (duration). April 1st, meeting, Wolverton; subject to be announced later. Buckingham: March 13th, ordinary meeting; subject not decided upon. March 27th, Building evening, March 19th, members' visit to Olympia. Flying every Saturday at both grounds to commence 2-2.30 p.m.

Monthly Report.—Stony Stratford: A meeting was held in S. and A. Institute, Wolverton, Feb. 4th. Topic for the evening, "The Bragg Smith" Model paper read by Mr. R. Elmes. Feb. 14th, Elmes, in a rough wind, getting flights of 200 yds., Brown flying single propeller machine, too lightly loaded for wind. O. Hamilton, jun., was successful in obtaining flight of 81 yds. 2 ft. with his single propeller r.o.g. A business and building meeting held at clubroom on the 18th, when Mr. O. Hamilton, jun.'s flight of 81 yds. 2 ft. was passed as a record in Class No. 4a and 5a. Arranged for a lantern lecture to be held. Buckingham: Usual fortnightly meetings and flying each week end. The item of interest has been Mr. Palmer flying a new plane patented under the name of the "vibratory wing" for a Buckingham gentleman. The club joined in a competition for distance on Feb. 21st, in a drenching rain. It was decided to fly one trial only, with the following result:—W. Palmer, 1st, 150 yds.; 2nd, E. Brown, 117 yds. 2 ft.; 3rd, R. Elmes, 111 yds.

Wimbleton and District (165, HOLLAND ROAD, W.).

FEB. 28TH and March 1st flying as usual.
Monthly Report.—Very little flying during past month, as the weather has been very unfavourable, and members have been busy on their Olympia models. Mr. Hayden has had out a small biplane, type O-2-1-P2, getting very good results. The machine is very stable and flies well in all winds, although the duration is only about 40 secs. Mr. Tucker has had out his Martinsyde monoplane on several occasions, getting very long straight flights at a good altitude. Mr. Laing brought out his Olympia twin-screw, but had the misfortune to catch in the branches of a tree, breaking one of the screws. Mr. Easdale's Dunne tractor has been flying well, and shows great stability. The best flights so far being 45 r.o.g. and 48 h.l. Mr. Smith has flown his small twin-screw machine in all weather, getting distances up to $\frac{1}{2}$ mile, and durations up to 50. All members who have not yet sent in their entry forms for Olympia are requested to do so at once, as they must all be in before March 4th.

UNAFFILIATED CLUBS.

Burton and District Aero Club. (156, SHOBNALL ROAD.)

Monthly Report.—This club, although only started in January, has already a large membership, and the quality of the work turned out has greatly improved also, which shows the advantage of joining a club where the members are able to see one another's work and each try their best to turn out something better. The club record for single-screw monoplanes is at present 40 secs., held by H. Robinson. Messrs. Fearn and Metcalf tie with 27 secs. The consistent flying of Mr. N. L. Fearn's 3 ft. 6 ins. mono. being a feature of the weekly meetings. Mr. J. Makin has made a very fine hydroplane mono. Feb. 16th a lecture was given by Mr. C. G. Robinson on "Model Aeroplane Propellers," at the Y.M.C.A. Hall. Practical demonstrations were given of the thrust of different propellers on an apparatus showing the thrust in ounces, and diagrams relating to the subject were shown on a large screen, the lantern being lent and operated by Mr. F. Metcalf. Other lectures are to be arranged in the near future, and as the subscription is low—viz.: 2s. 6d. yearly for juniors under 16, and 5s. yearly for seniors—a much larger membership should be obtained. A competition is to be held on Good Friday, and a stand is being reserved for the club at the annual flower show.

Dundee Aero Club.

Monthly Report.—Annual General Meeting held in Clubrooms, Y.M.C.A., on Feb. 19th. New office-bearers were elected as follows:—Chairman, Mr. I. M. Luis; Secretary and Treasurer, W. Powrie. Committee: Messrs. Luis, Powrie, Robertson, Maxwell and Hall. As the new Session commences on March 2nd, all intended members are invited to communicate with the secretary, or to call at the clubrooms any evening between 7.30-10. First flying meeting for the year March 28th. Place later. Thanks to a Cake and Candy Sale which the Club held on Jan. 20th, and which realised the sum of £12, we will be able to

start our new season with a clean sheet. With the advent of the hydro-aeroplanes to the Naval Base, and the presence of the aeroplanes at Montrose, interest seems to be awakening in Dundee, and we hope ere long to secure several new members. The club is sustaining a great loss owing to our late secretary, Mr. Jas. Farningham, having to leave us to take up an important position out of town. During his year of office, Mr. Farningham has helped the club in no small way, and we all owe him a debt of gratitude for the efficient way in which he carried out his duties. Working the club in a new system, we hope to do something to lift it from the lowly position it has occupied of late. The annual subscription has been changed to monthly payments of 6d., or 5s. per annum.

Finsbury and District (52, LAMBTON ROAD, STROUD GREEN, N.).

FEB. 28TH, competition, commencing 3.30 p.m. Two silver medals and other prizes offered.

Monthly Report.—During month flying by Mr. B. H. Barnard (Deperdussin type tractor), Mr. Richards (tractor biplane), S. Gibbs, and S. Barnard (Caudron). **Ilford Model Ae.C. (83, ENDSLEIGH GARDENS, ILFORD).**

FEB. 28TH, March 1st, 7th, 8th, 14th, 15th, 21st, 22nd, 28th and 29th, flying as usual at Newbury Park at 10 a.m. (weather permitting). The first annual social and dance will be held at the Kensington Hall on Wednesday, March 4th, at 7.30 p.m. sharp. Tickets, singles 1s. 6d., doubles 2s. 6d., can be obtained from the secretary at the above address.

Monthly Report.—Very little flying this month on account of the boisterous weather. Tractors are more in evidence now. All machines in the club are r.o.g.s. Feb. 1st, wind exceedingly boisterous, flying almost impossible. Best duration, put up by Mr. B. Seabright, was only 27 secs. Mr. R. C. Nicholls had the misfortune to smash two monoplanes and one biplane. Good flights were put up by Messrs. R. C. Nicholls, J. L. Hartnoll, B. Seabright, J. P. Leggett and A. Tupper. These flights, other than Mr. B. Seabright's, were not officially timed. Feb. 14th, gale, Mr. R. C. Nicholls, however, obtained 480 yds. with his r.o.g. monoplane (not officially measured). Feb. 15th, very gusty. Some very fine flights were put up by Messrs. R. C. Nicholls, B. Seabright, G. Warren, J. L. Hartnoll, A. Tupper, H. Triggs and F. Rappey.

Liverpool Aero Research Club (62, CEDAR GROVE, LIVERPOOL).

Monthly Report.—Chief interest is centred on the club exhibition, May 2nd. Particulars of open flying competitions in conjunction with same next month. B. Lear takes all honours this month for outdoor flying, making some really splendid flights with 1-1-O-P2 machines.

Scottish Ae.S. Model Ae.C. (5, DOUNE QUADRANT, GLASGOW).

MARCH 7th, 14th and 21st, Paisley Racecourse, h.l. and r.o.g.s.
Monthly Report.—At a Committee meeting on Jan. 26th, the resignation of the Secretary, Mr. W. Foster, was received with much regret. Mr. Jas. C. Balden and Mr. W. G. Langlands were appointed hon. joint secretaries. All correspondence in future to be addressed to Jas. C. Balden, 5, Doune Quadrant, Glasgow. On Jan. 28th, Dr. J. G. Gray delivered an excellent practical lecture on "Gyroscopes and their Applications." Dr. Gray showed that the mono-rail system now in use was unsuitable for application to aeroplanes or airships. Acrobatic figures animated by gyroscopes were shown performing on trapezes, walking hand over hand along wires, balancing on tight and slack wires by means of poles, riding bicycles and stabilizing, and steering two and four-wheeled motor cars. A system of applying gyroscopes to an airship was also shown. Owing to rain and wind there has been no flying done during the past month, but work has been going on steadily in the workshop, and several new models are now ready for testing. On March 4th Lieut. Arthur M. Langmore, R.N., will lecture on "Hydro-aeroplanes." A paper by Mr. V. E. Johnson, M.A., entitled, "The Use of Models in the Development of the Aeroplane," will be read on 18th March. Both lectures will be given in the Engineers' and Shipbuilders' Institute, Elmbank Crescent, at 8 p.m. The second half of the session has now commenced, and intending members can now be enrolled. Subscription for half session ending 10th Sept., 4s. Full particulars from the Hon. Joint Sec., Mr. Jas. C. Balden, 5, Doune Quadrant, Glasgow.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).

FEB. 28TH flying demonstration on Woolwich Common from 3 o'clock until dusk; March 1st at Blackheath, from 7 to 10 a.m.

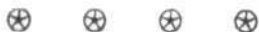
Monthly Report.—As regular readers of FLIGHT are no doubt well aware the past month has been one of exceptional industry for the S.E.M.A.C., as the following report will show. On Jan. 29th, the club held its first exhibition at Peckham, and the number of models on show was easily a record for a local exhibition. Marked originality was evidenced by the majority of members and the large number of visitors commented very favourably on this. Prominent among the models was a large steam-driven monoplane constructed by Mr. H. H. Groves, whose machine has made several excellent flights on Blackheath and was the winner of last season's "Olympia" prize offered by the Royal Aero Club. Another large monoplane, named the "Gnat" was shown by Mr. J. H. Dollittle, and was of the tractor type, engine being driven by compressed air instead of steam. Considerable interest was created when Mr. Dollittle demonstrated the capabilities of his five-cylinder engine, which is built on the Gnome principle. A model greatly appreciated by many visitors was a scale copy of the well-known Morane-Saulnier monoplane, constructed by Mr. F. Plummer who was congratulated on the fine workmanship displayed, both on this machine and on a large 20-oz. r.o.g. tractor monoplane, a splendid biplane fitted with a four-bladed tractor-screw and a twin-prop. duration mono. Mr. G. H. Westwood made a good show with three tractor monoplanes, and Mr. R. W. Prance had on view a nicely constructed "Morane" as well as a cleverly designed and beautifully built single-cylinder engine suitable for either steam or compressed air. Mr. A. D. Nicholls exhibited a whole series of models, consisting of his "Martinsyde" mono., which should prove a fine spectacular flyer, a neat little duration biplane, a hollow-spar weight-lifting machine and an r.o.g. hydroplane. Mr. L. B. Morris showed a new r.o.g. tractor of clean design, and Mr. G. Brown a partially built scale "Avro" biplane and several propeller-driven monos. Mr. A. F. Chinnery and Mr. E. W. Brunton each presented for inspection two capital models, and those indefatigable brothers, Messrs. C. and A. Beere displayed a comprehensive show of "tractor" models. Mr. F. W. Evans and Mr. F. Dixon showed their respective rise-off-ground monoplanes, and Mr. F. Edwards a neat hollow-spar biplane and a geared-motor tractor mono. Altogether nearly 50 models, as well as numerous parts of historical aeroplanes—including pieces of the propeller and fabric used by the late Mr. S. F. Cody in his flight round Great Britain—were shown. On Feb. 5th, the club's second indoor exhibition was held at Plumstead, and a splendid collection of models was exhibited. There was a large number of visitors, many of whom were thoroughly acquainted with the various technical points of the machines, and some were quickly involved in arguments on the various ideas embodied in the models, the resulting discussion should prove of considerable value. The largest model was Mr. G. H. Westwood's very original tractor monoplane, which has made many very fine flights on Blackheath. Other large tractors were shown by Messrs. A. D. Nicholls, C. Beere and A. F. Chinnery. Mr. E. W. Brunton exhibited a whole stud of monoplanes, including a "Meteor" hydro-aeroplane, which is also

capable of rising off land, a very neat r.o.g. twin-prop. model and a small single-screw tractor. Mr. W. Jones showed a new r.o.g. mono., and Mr. Arthur Beere two monoplanes and a biplane of the tractor type. A very smart single stick model and a fair-sized tractor were shown by Mr. R. W. Prance, as well as his single-cylinder engine. Other interesting models made by Messrs. Plummer, Brown, Norris, Cox, Greenhill, and H. Clements were on view and Mr. A. B. Clark exhibited his scale Blériot which came in for a good deal of attention owing to the complete set of controls and intricate spring-suspended landing-gear appealing to many people, who were, apparently, endeavouring to qualify for their pilot's certificate. On Feb. 18th, 19th and 20th, a three-day exhibition (in conjunction with the 1st Sydenham Troop B.P. Scouts) was held at Sydenham, where demonstrations of flying with small models were given, to the huge delight of an appreciative audience. Branches are now being organised at Woolwich and Sydenham, and the Hon. Sec. (Mr. A. B. Clark) would be pleased to hear from aero-modellists residing in either of these districts. Despite the inclement weather the club's various flying meetings—which are now practically local fixtures—have been well attended, some of the best flights having been made by L. B. Norris with a twin propeller all-metal mono., and a very neat tractor. A. D. Nicholls and A. F. Chinnery with twin-prop. hollow-spar monoplanes and F. Plummer with his large 4 ft. 3 in. hollow-spar model have also done their share towards arousing local enthusiasm. F. Beere's small tractor has been giving excellent exhibitions of "looping" also Mr. McLaughlin whose 4-ft. single propeller model makes six complete successive loops as regularly as clockwork. This model also performs Mr. Hamel's speciality, commonly known as the "apple turnover." Other looping machines are Mr. Bennett's "A" frame and A. B. Clark's veteran all-metal monoplane. Messrs. C. and A. Beere's usual stud of tractors have been very busy and G. H. Westwood has had excellent flights from his numerous collection, while F. Dixon has been experimenting with a Dunne-type glider. G. Brown and A. B. Clark's single propeller models and F. Edwards' hollow-spar duration biplane have also put up noteworthy performances.

Twickenham Model Ae.C. (74, CLIFDEN ROAD, TWICKENHAM).

FLYING as usual at the Chudleigh Estate on Feb. 28th and March 1st.

Monthly Report.—Not much flying during the past month owing to the shocking weather, but a great deal of work has been done at the indoor meetings, among which the tests for the first and second class *brevets* and the design of badge have been decided on and a committee appointed. On the 31st ult. and 1st inst. Messrs. Franklyn, Stagg, Hill, Clayton, Whyte, Maynard, and Rice-Skinner out with tractors, Mr. Stagg being conspicuous for the trick flying of his little Dep. S. Messrs. White, Ord and Franklyn obtaining such flights with flying sticks as to have shown more than ever the necessity for obtaining a larger flying ground. Feb. 14th and 15th, flyable days, although squally. Flying stick competition, for duration only, won by Messrs. Stagg and Rice-Skinner, who collaborated. The tractor competition was postponed indefinitely as the weather has been impossible for flying tractors. On Feb. 22nd, Messrs. Whyte, Ord and Golding out with flying sticks, and Messrs. Williams, Stagg, Maynard, Franklyn and White flying tractors. Mr. Franklyn passed his second class *brevet* test with a tractor, and Messrs. Ord, Stagg and Maynard finished half the tests. The club is improving vastly in the workmanship of the models, some approaching Olympia style in finish. This month's new members include Messrs. Golding, Knowles, Barnes and Clarke.



AERONAUTICAL SOCIETY OF GREAT BRITAIN.

Official Notices.

1. **Meeting.**—The eighth meeting of the present session will be held on Wednesday, March 4th, at 8.30 p.m., when Mr. Mervyn O'Gorman, C.B., M.I.M.E., A.F.Ae.S., will preside. Mr. Archibald R. Low, M.A., A.F.Ae.S., will read a paper on "The Rational Design of Aeroplanes," followed by a discussion.

2. **Annual General Meeting.**—The annual general meeting of the Society will be held on Wednesday, March 18th, at 8 p.m., at the Royal United Service Institution, Whitehall, S.W. (Rule 39).

The last day for the receipt by the Secretary of notice in writing from any voter wishing to propose any subject for discussion at the annual general meeting is March 3rd.

B. G. COOPER, Secretary.



Birmingham Aero Club.

Monthly Report.—Some very fine sport during the past month has been had with land yacht. During the early part of the month when there were some high winds during the week-ends, very fine runs were made with two members on board, and when only one member was steering, speeds approaching 35 miles per hour were attained, although at this speed it was very difficult to keep in the seat over the bumpy grassfield.

On February the 7th and 8th, Mr. W. R. Beaumont had his biplane glider out for its initial trials, and owing to his trying to manage the glider on Sunday morning without any assistance, a smash resulted, and by the time the members arrived it was in a hopeless state, being battered and blown across the aerodrome. His power-driven monoplane is nearing completion, and will be ready about Autumn.

Mr. N. Stamps' glider is now completed, with the exception of the covering, and we hope to see this soon at the club's aerodrome at Billesley. He is shortly starting on the construction of a power monoplane of original design, and which it is expected will be ready in about three months.

Messrs. Löwy and Swinger have experienced some bad luck with the Anzani engine on their monoplane, but it is expected to be got going at any time now.

Some very fine flying has been executed by Mr. E. Prosser on his Caudron biplane at the club aerodrome, his spirals being very

excellent. He experienced a narrow escape a fortnight back through a valve breaking when banking rather steeply near the ground, but managed to land with very little to spare, and, had his altitude been a few feet lower, it is fairly certain that he would not have got out of the difficulty so well and without accident.

The next monthly meeting at the Colonnade Hotel, New Street, takes place on Monday, March 2nd, at 8 p.m.



CORRESPONDENCE.

The R.A.F. and the Industry.

[1841] I fail to see the least why a careful reading of Octopus's letter should have prevented my writing mine. He objected, and still objects, to a Government department acting as "designer, buyer, and seller" at the same time. Well, he is perfectly at liberty to do so, but I fail to see why I should not also be at liberty to point out that it is the practice of all important Government departments in all countries of first-rate standing, except in details of subsidiary importance, and that the same practice applies to large private firms. In Naval matters, for instance, some ships are built in the dockyards, some by contract to Admiralty design. Further, cartridges, powder, shot, guns, rifles, &c., are bought all to Government design. Octopus says that what suits a private firm may not necessarily suit a Government department; but in this particular case, if it is found that the best result for the money is got by specifying accurately what one wants in private life, I do not myself quite see why it should not be the best for a Government department.

I do not quite see the drift of the last sentence of his letter. The fact that the Admiralty both designs and buys ships has certainly not killed the industry of building war-ships in this country.

F. STRICKLAND.

Possibility of Crossing Atlantic.

[1842] With reference to the article in your current issue, and the query as to whether an engine could be made to stand up for (say) 18 hours, have you thought of the phenomenal performance of the little 15 h.p. Argyll sleeve-valve engine at Brooklands last summer? The two runs of 14 hours each by no means represented a limit! the engine came back here in perfect order.

It may interest you to know that the aeroplane engine built on the same lines has displayed the same outstanding feature in its initial tests, viz., a regularity which is almost monotonous.

For ARGYLLS, LTD.,

J. S. MATTHEW, Managing Director.

Alexandria, Dumbartonshire, Feb. 24th, 1914.



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